Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone and Sound Waves

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Index to Advertisements, Page 56 — Classified Advertisements, Page 55

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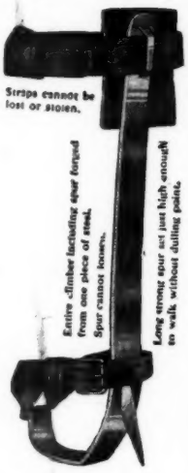
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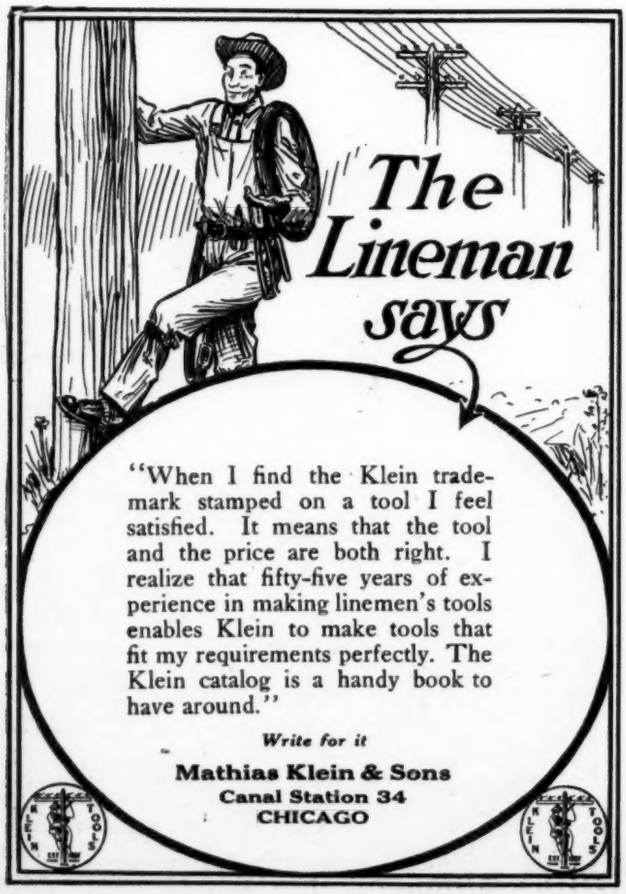

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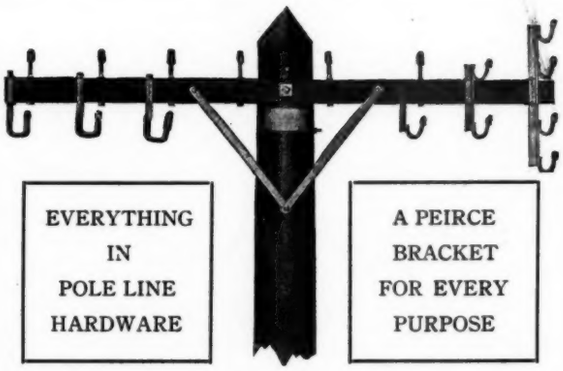

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PERSONAL EFFICIENCY

There is a human element factor in all of our life's work which must ever be taken into account. Knowledge regarding it is essential, even more so than that of materials and structures.

We are all individual units in this vastly important human element; and the men who direct our activities, and those who work side by side with us, and those whose work in turn we direct, are one and all individual units like ourselves, in the great sum total of human endeavor and achievement. Every human organization is, therefore, a grouping together of these various individual units for the accomplishment of some common end; and whenever such an organization is successful and efficient for the work it is intended to do, it is because the many minds and hands of which it is composed have the proper affinities for each other, and are as nicely adjusted one to the other as are the various elements of a stable compound or the many parts of a perfect machine.

In other words, both individual efficiency and collective efficiency are essential but individual efficiency is the primary requisite.—Charles Frederick Loweth.

The Reorganization of the Inter-State.

The reorganization and regeneration of the Inter-State Independent Telephone & Telegraph Co., of Aurora, Ill., details of which are printed elsewhere in this issue, are of paramount interest.

This system, the main artery of the big Independent plant in Chicago, is now, after years of uncertainty and doubt, to be preserved as an Independent property. Not only is it to be preserved but it is to be strengthened and enlarged and placed on a solid foundation both physically and financially.

The Illinois Telephone & Telegraph Co., operating the Independent plant in Chicago, has other outlets and connecting lines. It will have more. But none will be of more importance than the widespread and far-reaching Inter-State system. Had this company come into the possession of the Bell interests, as has at times seemed imminent, and been allowed to fall into disrepair or actually wrecked and abandoned, as it might have been, a large, productive and profitable territory would have been lopped off from Chicago and a damage wrought which, while not irreparable, would have seriously hampered Independent development both inside and outside that city for years.

The interests now in control of the Inter-State declare definitely and without equivocation that the properties are and will remain Independent. The declaration is being backed by deeds. There seems, therefore, no room for doubt that the Inter-State is now to take its place permanently as a live and constantly developing part of the great central group of Independent systems.

Success.

There came into TELEPHONY's office recently the following essay on success, signed by Edmund R. Ward. We do not know where this first appeared, and, hence, can give no other credit than this, but it is fine and sound and worth reading:

The price of success is a matter of development of mental essentials, of concentration, of earnest desire to live up to the limit of our possibilities. That which the world recognizes in a man as success is simply the development of his natural talents. Man is not placed on earth a finished product. He is given the raw material by his creator, and what he makes of that material is up to him.

The constituent parts of the human being, the same kind of mentality which made possible the greatest achievements of the greatest men the world has ever known, are possessed in degree by every normal man, the development of which makes for success.

Lack of success is not caused by lack of opportunity. Men grow their own opportunities, but they often fail to harvest the crop. The time a man spends in envying the

success of others could better be spent in trying to emulate the process by which that success came, and in gathering the ripened fruit of opportunities.

Each day has its own particular kind of ripened fruit of opportunity, which must be gathered on that particular day, if ever. If men would live nearer to the limit of their possibilities they would thereby grow stronger for greater achievements, just as physical exercise will develop weak muscles.

If a man has ability he will always find opportunity standing with open arms to receive him and offering prizes for the development of his talents. Some men have ability as manufacturers, others as salesmen. Both are necessary, but the success of any business depends very largely on salesmanship. In fact, the one supremely difficult thing in business is salesmanship.

Goods may be manufactured on formula, and that formula may be transmitted from one person to another, but the salesman never transfers his secret. He cannot. It is a part of himself; it is his personality.

Ability in any direction is good, but the ability to discover and develop ability in others is the better. It is that qualification which fits men for heads of large industrial and financial institutions. Their success depends on the development of that talent.

Abuses of Long Distance Service.

Each and every operator of a telephone company can be of material assistance in reaching the maximum development of long distance telephone service over its lines.

The sending operator, who has direct charge of the long distance lines, can save many minutes a day and increase the capacity of the lines many fold by carefully observing all the rules and regulations cited in the company's routing book.

The operator who receives messages can assist wonderfully in increasing the number of messages handled within a given period and add to the capacity of the lines by prompt service in making connections. She can assist materially in the increase of the earnings of the lines by completing calls which, except for her care, attention and ingenuity, would be lost to the company.

Much time is lost and the lines used unnecessarily by the operator's failure to use the "code symbols" in passing, reporting and receiving messages.

All disputes and arguments between operators as to who has the right of way over the line, and other things of this nature, should be avoided. The fewer there are of these disputes, the more efficient is the service.

One of the most vexatious things in long distance work is to find that company business is going over the lines in hours when the commercial business reaches its highest volume.

Company business is necessary to a certain extent, but it is costly when it displaces commercial business. No company business should be handled, either by direct communication or service messages, during the busy hours of the day. This is an economic principle over which there can be no dispute. Managers and special agents should bear this directly in mind and take great care in the use of lines for company business.

Another vexatious feature to the commercial department which is endeavoring to build up the long distance business to its greatest capacity, so the lines will earn the largest possible amount of money, is the secret use of the lines by operators and employes of the company in conversing socially with each other. Operators, in holding conversation with each other, no doubt overlook the fact that they are depriving the company of the money involved in the time taken in the transmission of such messages. Also that they are depriving the company of its rightful returns as much as though they actually took money from the cash drawer without proper accounting.

PLANK IN NEW PROGRESSIVE PARTY PLATFORM TOUCHING ON MONOPOLIES

We demand a strong national regulation of interstate corporations. The corporation is an essential part of modern business. The concentration of modern business in some degree is both inevitable and necessary for national and international business efficiency. But the existing concentration of vast wealth under a corporate system, unguarded and uncontrolled by the nation, has placed in the hands of a few men enormous, secret, irresponsible power over the daily life of the citizen—a power insufferable in a free government and certain of abuse.

This power has been abused in monopoly of national resources, in stock watering, in unfair competition and unfair privileges, and finally in sinister influences on the public agencies of state and nation. We do not fear commercial power, but we insist that it shall be exercised openly, under publicity, supervision, and regulation of the most efficient sort, which will preserve its good while eradicating and preventing its evils.

To that end we urge the establishment of a strong federal administrative commission of high standing, which shall maintain permanent active supervision over industrial corporations engaged in interstate commerce, or such of them as are of public importance, doing for them what the government now does for the national banks and what is now done for the railroads by the interstate commerce commission. Such a commission must enforce the complete publicity of those corporate transactions which are of public interest; must attack unfair competition, false capitalization, and special privilege, and by continuous trained watchfulness guard and keep open equally to all the highways of American commerce.

We pledge ourselves to the enactment of a patent law which will make it impossible for patents to be suppressed or used against the public welfare in the interests of injurious monopolies.

The Overhead Plant of a Modern Telephone System

An Interesting Paper Recently Presented Before the Philadelphia Telephone Society and Reproduced Through the Courtesy of The Telephone News—Distribution Methods—The Corrosive Action of the Pittsburgh Atmosphere—The Tight and Slack Messenger Wire—Cable Crystallization

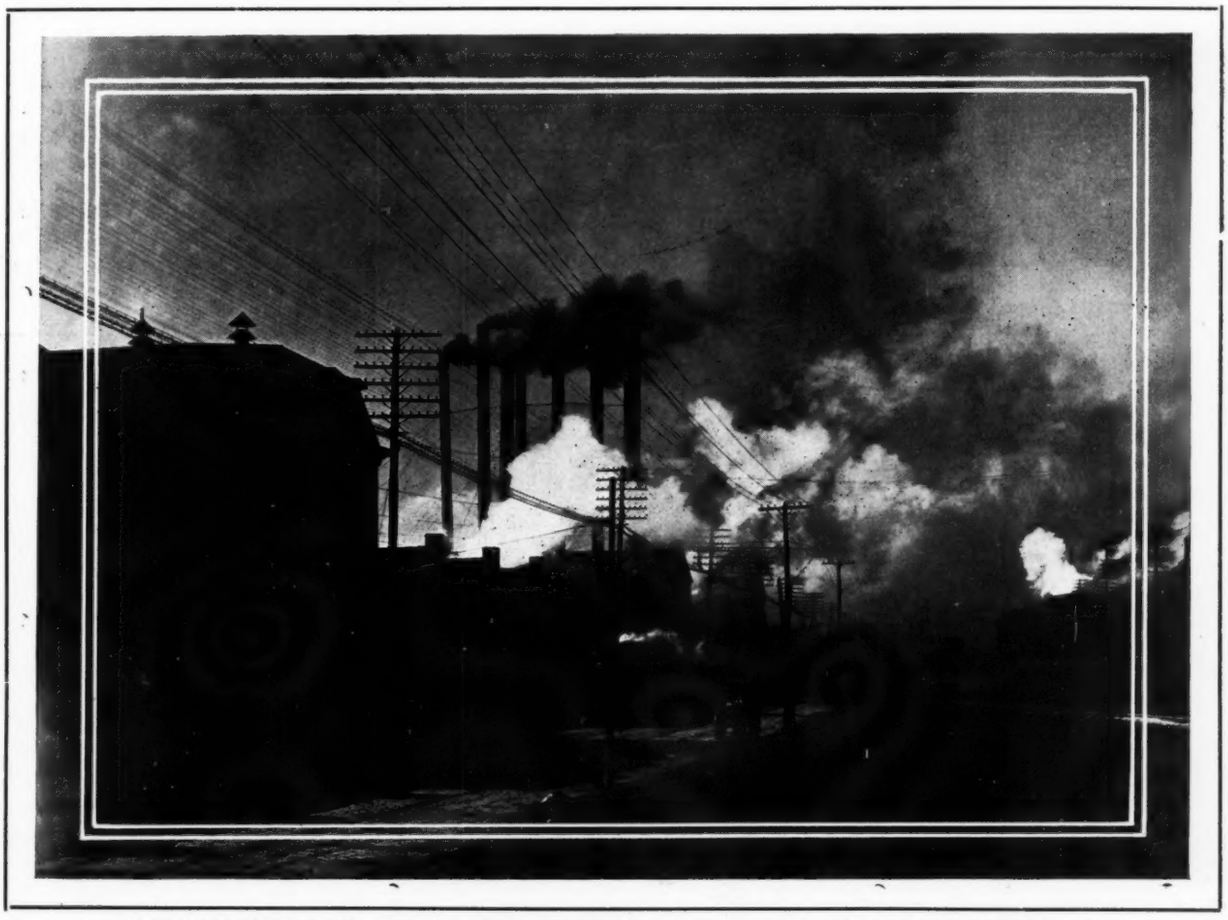
By Sergius P. Grace

The public is ever wanting all poles removed and sees no reason why it should not be done, since the success of the underground wire distribution in the business districts of so many cities has been thoroughly demonstrated.

Now, all progressive telephone companies believe most thoroughly in underground distribution and are extending their underground conduits as rapidly as good economy for the benefit of both the public and the company will permit. Underground wires are cheaper to maintain than overhead wires, but the additional fixed charges brought about by the large sums required for underground work, make underground distribution prohibitive except in thickly settled business districts and along main feeder routes to the residence and other sections of the various cities.

In curve No. 1 are shown the varying costs between underground and overhead construction, from which it can be seen that not until we reach 800 to 900 pairs along a route can we truthfully say that underground construction in annual charges will be cheaper than overhead construction. The economical point will, however, vary in different parts of the country. Consequently the publicly despised pole lines must be brought into use on many streets and alleys of our various cities if we hope to give the public telephone service at a reasonable cost.

Those who are familiar with the congested and thickly settled cities of the East, such as Philadelphia, New York, Baltimore and Washington, where the entire city area covers a few square miles only and, therefore, a large amount of underground conduits for distribution purposes is perfectly justified, perhaps do not realize the different conditions existing in some of the western cities, and particularly Pittsburgh, where, because of the river valleys and the extremely rough topography of the surrounding hills, the city must necessarily spread over many square miles of area. Pittsburgh rather than being a condensed city, consists of a series of settlements, usually connected together along main business arteries through the valleys. For these reasons, we have had to confine our underground construction principally to the feeder routes through the valleys and rely upon side pole lines for distribution.

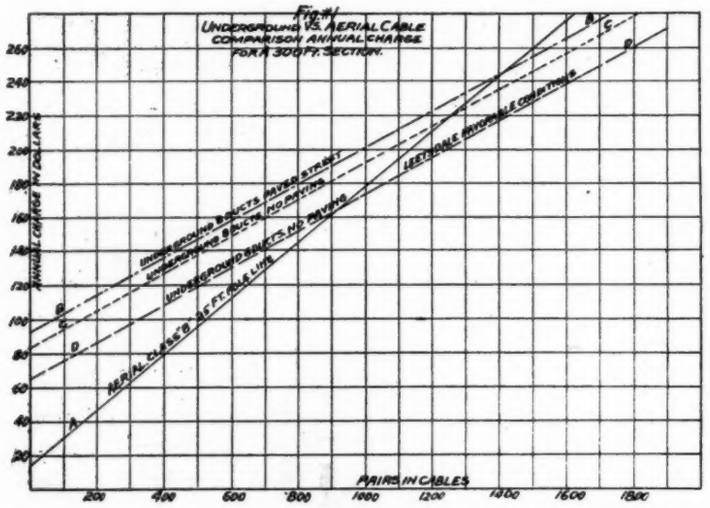


Aerial Telephone Construction Among the Blast Furnace Fumes of the Steel District in Pittsburgh.

To have attempted a comprehensive scheme of underground distribution for each individual block throughout the city's territory would have been so enormously costly as to have financially embarrassed the company. Nevertheless, we have in Pittsburgh about 110 miles of trench feet of conduit, in which is contained approximately 78 per cent. of the total wire mileage of the city. You can see

from this percentage, the part the main feeder routes play in the carrying of the main cables.

Realizing that in the present state of the art, we must make use of pole lines for distribution in cities, let us for a few moments trace the development of the pole line for



Curve No. 1.—Annual Charges of Underground and Aerial Construction.

telephone distribution service in exchange areas. The telegraph lines with high poles and bare iron wires on cross arms were developed before the invention of the telephone, and, with the introduction of telegraph engineers in the telephone business, it was only natural that the distribution lines should be patterned after the existing telegraph lines. Therefore, in the earlier days of distribution of telephone wires, wherever pole lines were used, it was the almost universal practice to erect very high poles, fifty to sixty feet high, and equip them with eight, ten or more cross arms, as the cases demanded.

These old fashioned bare wire lines through city streets were very unsightly, and besides, gave an exceedingly large amount of trouble. In those days, the line trouble was very much greater than the switchboard or instrument trouble, and the bare wire distributing plant was usually considered to be the offender when any troubles occurred in the service.

When no more cross arms could be added to a pole line, recourse was had to short sections of cable, which were considered merely as auxiliaries to the bare wire lines.

In the territory of the Central District & Printing Telegraph Co., it was early seen that this type of distribution was practically impossible because of the winding streets, heavy grades, ravines and river valleys which are the accompaniments of a topographically rough country. Therefore, about 1896, to obviate these difficulties in the growing plant, the engineers of this company, principally Mr. Snyder and Mr. Donaldson, started a development and design of the aerial cable system of distribution which is standard today among all companies.

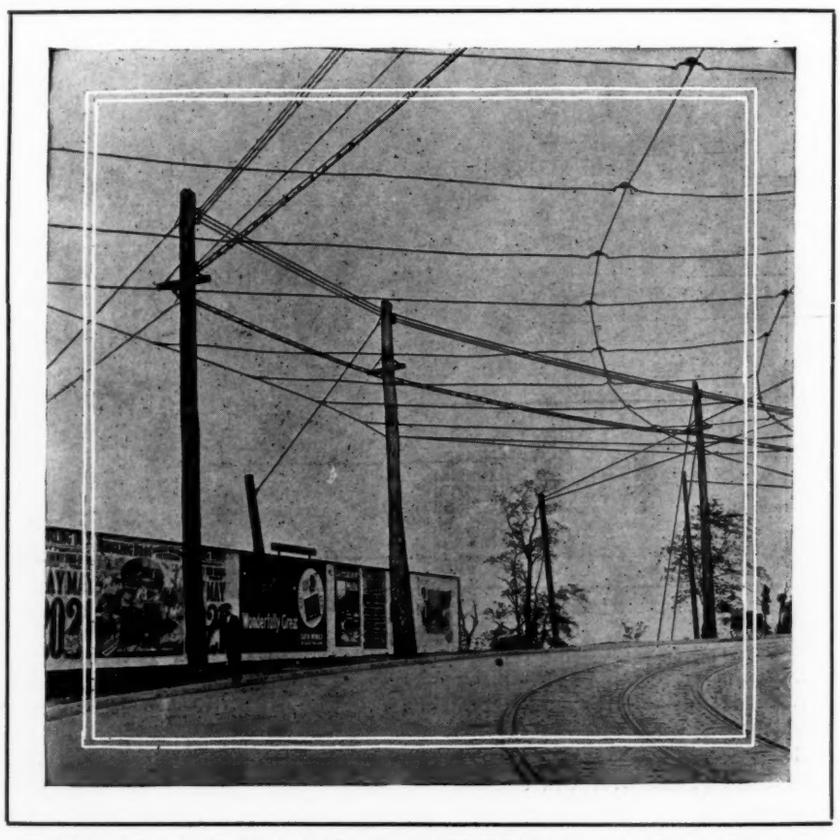
The development of these designs changed the entire appearance of the overhead plant. Instead of high poles, with many cross arms filled with bare wires, we find today low poles, usually not over thirty-five feet in height, with aerial lead cables attached near their tops, no cross arms, but tapping boxes at alternate poles, with arrangements for connecting the distributing wires to the buildings. Practically no wire is carried back and forth along the lead, since by the multiple tapping scheme, a certain number of pairs are brought out to the terminals on alternate poles, so that, even for party line connections, the service wires may be run direct from the terminal to the subscribers' premises. The aerial plant of the C. D. & P. T. Co. now represents 36 per cent. of the total plant investment, over one-third of which is cable.

Besides greatly improving the appearance of the overhead plant, and thus lessening the chances of public criticism, this style of construction has greatly reduced the troubles from the wire plant. In studies which we have made of trouble in modern plants, we find about the following percentages:

Switchboard trouble .....58 per cent.
Inside wiring and substation trouble .....28 per cent.

This leaves only 14 per cent. as chargeable against the outside plant between the terminals on the main frame and the terminals of the protectors at the subscribers' houses.

In other words, the outside wire plant, which is exposed to all the elements, is responsible today for only 14 per cent. of the total service interruptions. This is a direct reversal of conditions in the older days, and perhaps the principal comment would be that there is no necessity for so much switchboard and substation trouble. The maintenance of substation apparatus costs as much as the maintenance of the entire outside plant.



Joint Construction, Three Wire, Low Voltage Lighting Circuit at Top of Poles.

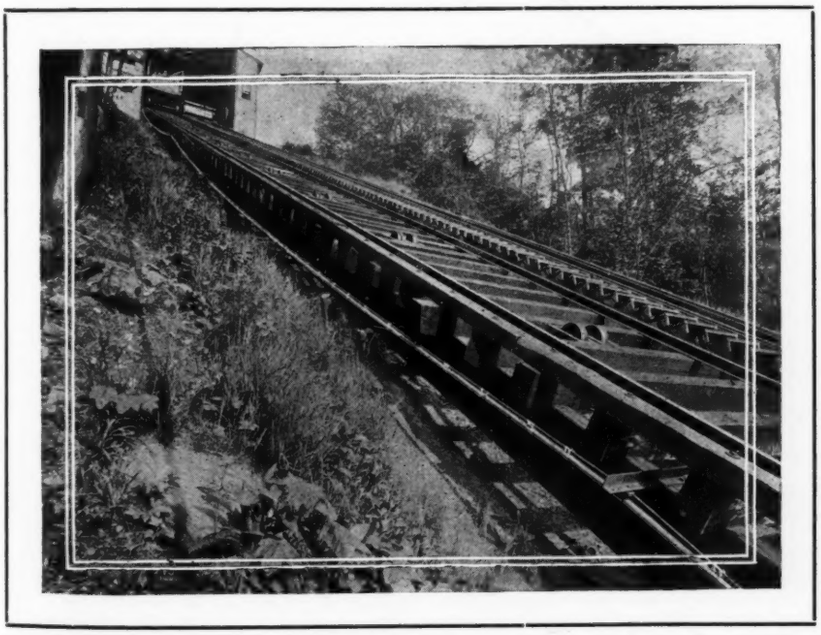
There are a variety of opinions as to the economy of

party line service from a plant standpoint, particularly in exchanges of 500 to 2,000 stations, in which places the outside plant is nearly always an aerial cable system. It has been said that any existing party line plant could be changed to single line with a comparatively small investment in cable pairs. This is true, but our exchanges do not grow that way in lumps, but gradually. Additional new lines would cost still more, or, because of the increased number of lines and reduced annual charges per line, party line service could be given more cheaply than ever.

In a gradually growing plant, if supervision is given to effecting party line combinations of an average of 1.8 for two-party and three for four-party, our studies indicate that the annual cost of a single line station is 1.5 times more than for a two-party and 2.3 times more than for a four-party station. Curve No. 2 shows this relation for exchanges in which the annual cost constant varies from $20 to $32 per line. The annual cost constant is for all the outside plant except drops and substation apparatus. There is clearly plant economy in party line service.

The principal units entering into overhead construction are poles, cross arms, cable, insulators, hardware and wire. In this country practically all telephone poles are of wood. The kinds of wood most generally used are cedar, chestnut and creosoted pine. Each has its locality where it is most economical and most generally used. There is, however, an increasing tendency to make use of other kinds of timber, particularly after being given a creosoted treatment.

Steel poles have been used very little in telephone work, although extensively used by the railway companies for trolley poles. In large sizes they are many times more costly than wooden poles and, besides, require constant upkeep in the way of painting. I feel sure that in the next few years there will be an increase in the use of poles made of reinforced concrete. A properly designed reinforced concrete pole should be sightly and provoke the least objections on the part of the public.



Cable Attached to Inclined Railway Which Has an Angle of About Forty Degrees.

All over the country there are agitations to reduce the number of poles in the various municipalities. It must be admitted that this is a reasonable request on the part of the public, although we may say that perhaps the public has erred in permitting so many companies to build their pole lines in the streets. It certainly appears as the years go by we will be called upon to do an increasing amount of joint pole line construction with other companies.

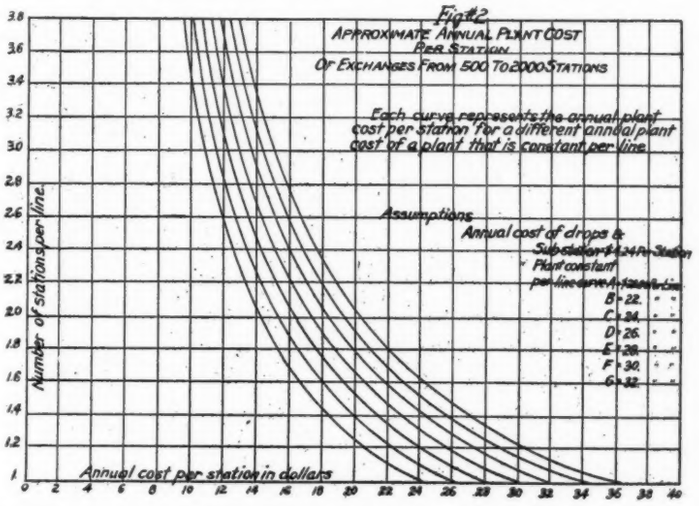


Fig #2
Approximate Annual Plant Cost Per Station
Of Exchanges From 500 To 2000 Stations
Each curve represents the annual plant cost per station for a different annual plant cost of a plant that is constant per line
Assumptions
Annual cost of drops & Substation $4.24 Per Station
Plant constant per line curve A $20 Per Line
B = 22.
C = 24.
D = 26.
E = 28.
F = 30.
G = 32.
Number of stations per line.
Annual cost per station in dollars
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
1 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

Curve No. 2.—Annual Plant Costs per Station, Different Size Exchanges.

A great step forward has been taken by the engineers of the American Telephone & Telegraph Co. in the working out of specifications for joint pole construction with electric light companies. Properly constructed, with electric light wires above the telephone wires, such joint pole line construction is safer to life and property than separate lines.

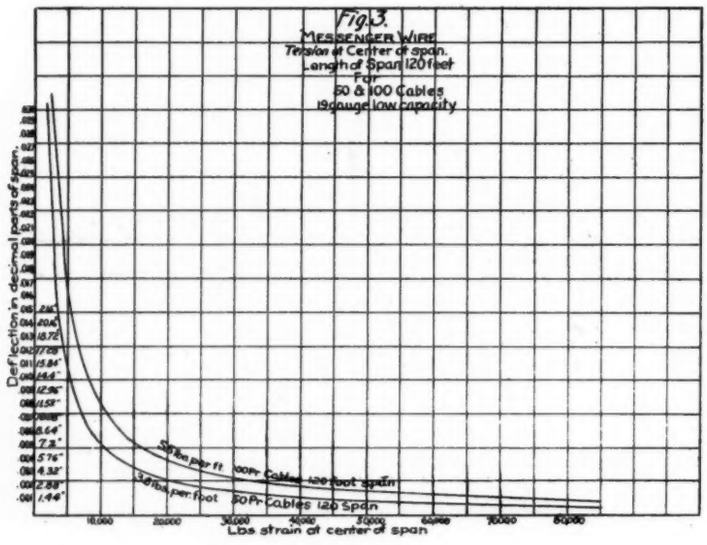
In many parts of the country, joint agreements have been perfected with the light companies, the standard specifications of the American Telephone & Telegraph Co. being substantially followed.

As a word of warning I wish to say that unless we voluntarily go into these joint pole propositions, we will in a short time be facing regulation of our construction by the engineers of the various public service commissions, which is very likely to introduce special methods for each state. At the present time the Bell system is national in its scope and we are able to effect great economies in engineering and construction by uniform design. To have this great advantage in uniform methods set aside would be a decided step backward.

Of course, you have all heard of Pittsburgh smoke and are willing to believe that Pittsburgh is just as black as it is painted. It would be futile for me to argue with you on this subject, and tell you of the glorious sunrises I see from my home on Squirrel Hill, when Dooley is authority for the statement that in Pittsburgh every other building is either a blast furnace or a Carnegie library. We do have smoke in our river valleys and blast furnace fumes in the air, which, aside from their esthetic effect, are decidedly destructive to our pole line hardware, such as braces, bolts, terminals, hangers and strand. For years we have had rigid specifications for this class of material and found it necessary to use only the best of galvanizing for protecting the steel.

Unless one is thoroughly familiar with the principles

underlying the protective action of galvanizing or zincing, when applied to steel, he will be deceived at the apparent long life of even defectively galvanized or cracked materials. Zinc is electro-positive to iron, and when a scratch or worn part goes through to the iron, there will be an electrochemical effect set up which slowly consumes the zinc, but protects the iron from rusting; consequently for several months or years, the exposed iron or steel will show very little rust or corrosion until finally the surrounding zinc has been so thoroughly eaten away that it can no longer protect the iron electro-chemically, and then rusting will start at a rapid rate. This is why galvanized material that has stood up well for perhaps four, five, six or seven years, may inside of two additional years be completely rusted away.



Curve No. 3.—Tension of Messenger Wires in Center of Span.

Having heard so much about it, I know that you will be interested in an analysis of Pittsburgh air made by Doctor Phillips, of the University of Pittsburgh. Doctor Phillips collected samples of rainwater at the beginning, the middle and the end of various showers. This water, having passed through the atmosphere, would naturally collect any foreign gases soluble in water and would also carry along with it any soot particles with which it came in contact.

The most remarkable thing about these tests, and the least expected, was the fact that rainwater collected, after passing through the Pittsburgh atmosphere, contained no trace of sulphuric acid. There was, however, found a small amount of ammonium sulphate, showing that the nitrogen in the air had combined with the sulphur dioxide and neutralized it. The amount of carbon dioxide was only two-thirds greater than in normal air, such as is found in Northern Canada. Whatever nitric acid might have been generated had been converted into ammonia. The atmosphere seemed to be entirely free from acid; in fact, was quite alkaline. It was found, however, that there was an active corrosive agent in the Pittsburgh atmosphere. This is the soot, which, being very porous, absorbs a considerable amount of sulphur, and when wet contains about two per cent. of free sulphuric acid. Apparently, then, the corrosive action in the Pittsburgh atmosphere is largely due to the collection of soot upon the surface of the coated metal and the liberation of sulphuric acid during the rainstorms.

The recent introduction of loading coils in aerial toll lines has made it particularly necessary that the insulation of these lines be kept very high. This has led to the very careful maintenance of the right of way of the pole lines and the trimming of all tree limbs that might come in contact with the wires. Also on some of the longest lines, porcelain insulators, which have a higher insulation resistance during rainstorms than glass, have been used to good advantage.

In the Pittsburgh district, where the toll lines traverse the river valleys in the neighborhood of the steel mills, we find it difficult to maintain a high insulation due to the accumulation of soot, and on a number of routes we have had the utmost difficulty in keeping the lines workable because of the accumulation of iron ore dust on the insulators and cross arms. This dust is of a metallic nature and floats through the air because of slips which frequently take place inside the blast furnaces during the feeding.

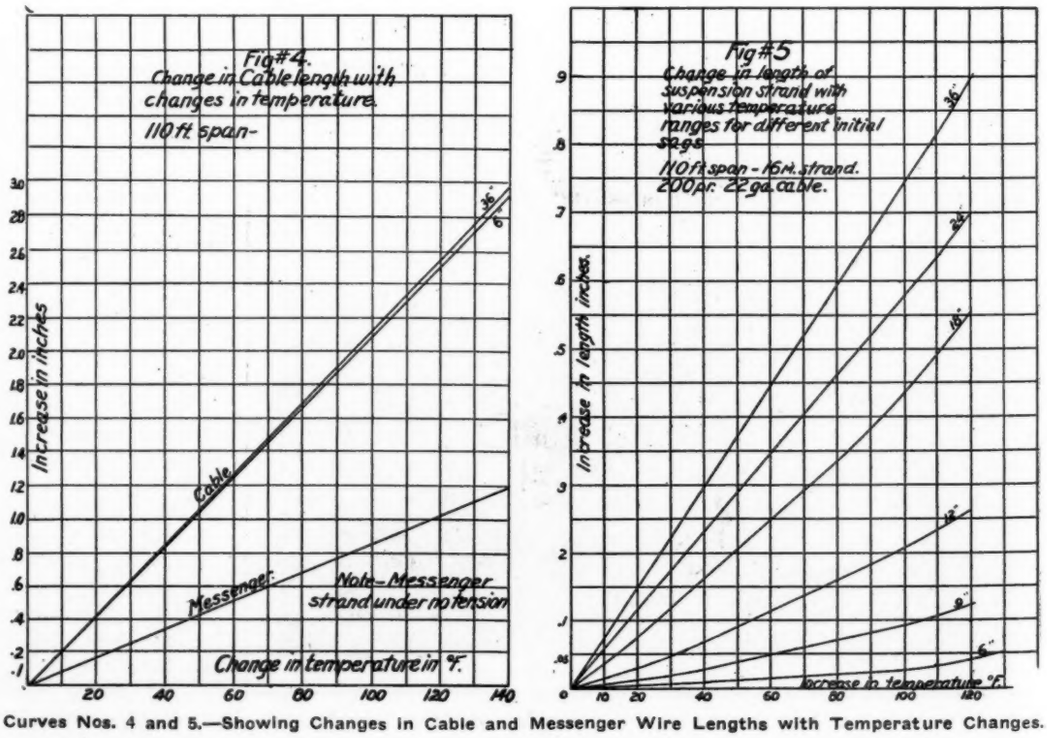


Fig #4.
Change in Cable length with changes in temperature.
110 ft. span-
Increase in inches
Cable
Messenger
Note-Messenger strand under no tension
Change in temperature in °F.
Fig #5
Change in length of suspension strand with various temperature ranges for different initial strains.
110 ft. span - 16 M. strand.
200 pr. 22 ga. cable.
Increase in length inches.
Increase in temperature °F.

Curves Nos. 4 and 5.—Showing Changes in Cable and Messenger Wire Lengths with Temperature Changes.

For toll line purposes, where bare wire is necessary, the universal practice is to use hard-drawn copper, with the possible exception of certain rural districts, where it is certain that no very long distance calls will be made.

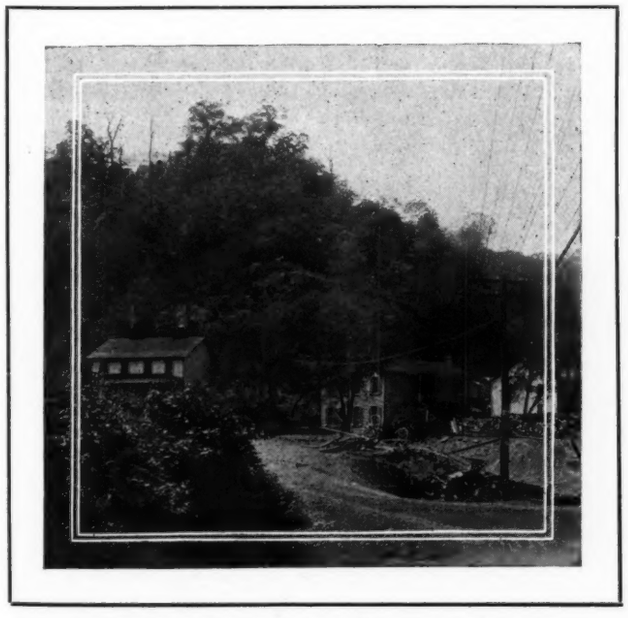
Under ordinary atmospheric conditions, copper is practically indestructible. There is an authentic case of a sheet copper statue in one of the interior towns of France, that in 200 years has lost in thickness only 1/1000 of an inch. Copper wire in the Pittsburgh district does not seem to deteriorate except in the vicinity of coke ovens, whose fumes contain the hundreds of coal tar derivatives.

In some locations we have had to renew copper wires every three or four years. Iron wire is of practically no value in the Pittsburgh territory except in the remote interior country sections. In exchange distribution, because of the introduction of the aerial cable system of distribution, there is very little need of bare wire for distribution purposes. There are a few places, particularly suburban districts, where bare wire on cross arms is more economical during the initial period than cable or insulated wire.

Generally speaking, the distribution in exchanges today is made almost entirely with cable and twisted pair distributing wires. There are many advantages in the use of twisted distributing wire, among which may be mentioned the freedom from trouble with electric light and power crosses. The twisted wire does not need to be strung on expensive cross arms, but can be attached, by means of small iron brackets and porcelain insulators, direct to the pole itself. The labor of stringing is very much less than bare wire, and the same thing may be said of removing the wire after it is out of service.

It makes a very convenient and economical type of unit construction, which can be used for establishing service prior to the time it is thoroughly demonstrated a cable will be warranted along the route. When the cable is placed the drop wires can be connected directly into the terminals, and that portion of the twist strung along the pole line can be taken down and used for other drop wires. The transfer expense is therefore small.

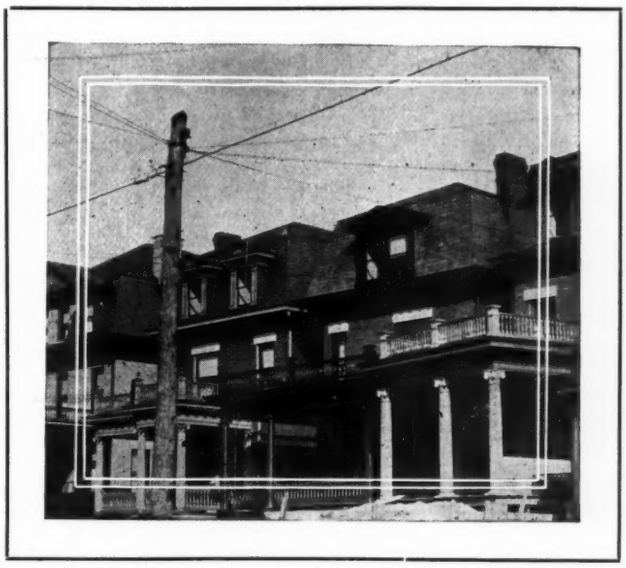
Until March, 1910, it was the general practice to use, for distributing purpose, No. 14 B. & S. gauge copper, rubber covered and braided distributing wire. This made a



Toll Line Construction in the Country Districts.

first class installation, but the wire was needlessly large and contained more copper, rubber and braid than necessary. Since the drop wire is usually connected to a 22-gauge cable pair, it can readily be seen that No. 14 copper wire was used for strength alone and not for its conductivity.

For the past two years the practice has been to use No. 17 B. & S. gauge copper steel, rubber covered and braided distributing wire. This wire has nearly the same tensile strength as the old No. 14 wire, but because of its lesser weight per foot, has a much greater factor of safety under



Typical Exchange Aerial Cable Construction in Pittsburgh.

all conditions of sag and ice-loading. Its cost is about $25 per mile less than the old No. 14 wire.

While on the subject of rubber covered wire, I would like to state that a good rubber wire is an economical investment, whereas a poor rubber wire is the poorest kind of an investment.

During the early period of the introduction of the aerial cable system in our territory, we were particularly careful as to the quality of the rubber wire we purchased. As a result all of the earlier wire has stood up in practice exceedingly well and undoubtedly has had a life of at least ten years. As an argument in proof of this statement, I wish to give you tests we made on samples of rubber wire from Wheeling, W. Va., which we were positive had been in service for a period of ten years.

Except for a few spots where the wire was mechanically injured it was in fairly good condition and capable of giving several years' additional service. The rubber still had considerable life and, when the wire was subjected to a tank insulation test, showed an insulation resistance of 232 megohms per mile after an immersion of 18 hours.

On a breakdown test, the insulation stood 15,000 volts, alternating, for 15 seconds before breaking down. The voltage was gradually raised to the above figure.

For a ten year old wire this is very remarkable, and if we could be assured that all the rubber wire that we have purchased would give the same results the drop wire part of the plant would prove very economical to maintain.

During recent years, with the many manufacturers in the field to supply the large demand, and the introduction of many kinds of rubber substitutes to just meet the specifications, I am afraid that our drop wires are going to cost us more than they would if the old quality of wire had been maintained.

The invention of the paper telephone cable and the use of the lead press to form the cover has been described so often that I will not weary you by repeating the details. One point I wish to bring out clearly is that originally lead cable was designed for use underground, for which purpose it is splendidly adapted.

Lead is a metal which should be used only under quiescent conditions, because of the readiness with which it crystallizes and cracks under repeated bending. I do not know the name of the genius who first found that lead cables could be successfully used overhead. He is to be congratulated that so unsuitable a material as lead has proved so successful for the purpose.

Let us consider what an unmated couple we have when we hang a lead cable on a steel rope. Lead has a temperature coefficient of expansion of .0000160 and that of a hard steel rope is .0000064. In other words, for any given change in temperature, a lead bar or cable sheath will expand two and a half times as much as a steel bar or messenger rope. In a 110-foot span, with a rise in temperature of 100 degrees Fahrenheit, a lead cable would increase in length 2.13 inches, while the steel rope would increase only .84 inch, leaving a surplus of 1.29 inches of lead which obviously must be stowed away somewhere.

The lead cable, by reason of its excess expansion, is forced into taking care of itself by moving into the pole dips or other bends or kinks along the cable. If the cable were free to move throughout its entire length and were placed on frictionless rollers, it would expand in a straight line and not into the dips and bends along the length of the cable. These dips or bends may be called nodes of least resistance into which the cable moves back and forth with every temperature variation.

These daily excursions of the cable into the dips and bends will, in a few months or seasons, cause deterioration in the cable and finally result in crystallization and cracking.

In the older forms of cable construction it was generally the practice to band the cables closely to the steel strands and leave at each pole a dip of four to six inches.

Realizing that there is a difference in expansion rates between the lead cable and the steel supporting wire, the only rational method of suspension is one that will permit the cable to take care of its expansion and contraction in long, sinuous waves, so that at no point will the stress in the lead go beyond its elastic limit. This can be done by long hangers, large rings or big pole clips.

I wish now to refer to the prevalent evil of tight messenger wires. There is a difference of opinion as to whether this makes a better looking job than loose messengers with uniform, sightly sags, but, as I will point out later, tight messengers have a most destructive effect on pole line construction and increase the difficulties from expansion and contraction troubles, which are the main cause of repairs and excessive depreciation.

A wire of uniform weight per foot, when suspended between two supports, will describe a catenary curve, the fundamental equation of which is

$$y = \tfrac{1}{2}\, a \left(E^{\frac{x}{a}} + E^{-\frac{x}{a}}\right) \qquad (1)$$

in which E is the base of the Naperian system of logarithms, x and y, coördinates, and a, the distance from the bottom of the curve to the horizontal axis. For catenaries of small deflection, the curve is practically that of a parabola, and we may write for the horizontal tension in the center of the span the formula—

$$T = \frac{WX^2}{2d} + \frac{d}{6} \qquad (2)$$

in which W = weight per foot of wire and cable. $X = \frac{1}{2}$ span in feet, d = sag at center of span in feet. From this equation the curves in Fig. 3 were plotted.

By referring to these curves, it will be noted how rapidly the stress in the messenger wire increases for a small decrease in the dip of sag of the span. For example, with a dip of 4.32 inches, the stress in the messenger wire supporting a 100-pair 19-gage cable would be 27,500 pounds, and for a 50-pair cable 17,500 pounds. If, instead of a 4-inch dip, an 18-inch dip had been given these messenger wires and cables, the stresses would be 6,000 and 4,000 pounds, respectively.

The standard sags which were worked out for our company are as follows:

Span in feet	Minimum sag in feet
100	2
115	2½
130	3
150	4

These sags were determined with a view to producing the least strains in the overhead construction consistent with clearance and a reasonably good looking job.

Under these conditions, a 400-pair 22-gage cable suspended with the standard sag will produce a stress in the messenger wire of only 4,203 pounds, or with a 16,000-pound messenger wire, a factor of safety of 4.

In addition to the great strain tight messenger wires place upon overhead construction, another peculiar effect is produced. A steel messenger wire is elastic, and, under a state of tension, will elongate to an extent dependent upon the modulus of elasticity of the material. When the stress is removed, the steel cable will come back to its original length, provided that we have not carried the stretching far enough to exceed the elastic limit of the material.

A tightly stretched messenger wire will be elongated nearly an inch in a 110-foot span, and its cross section will also be proportionately reduced. Now, under these conditions, if the temperature should increase, the sag will of course tend to increase an amount dependent upon the temperature coefficient of the material, but the increasing of the sag or length also has a tendency to reduce the tension in the wire and thus reduce the elongation which is dependent upon the modulus of elasticity.

Consequently, in a tightly stretched messenger wire, a condition of equilibrium will be reached in which it will be found that the length of the messenger wire will be increased but very little. Therefore, under these conditions, it is not a case of taking care of the difference in expansion between the lead and the steel, but, instead, almost the entire expansion of the lead will have to be taken care of and stowed away in some place. Obviously the movement which may be concentrated in a bend or pole dip, is very much greater than would have been the case if the cable had been placed on a messenger wire with a reasonable amount of sag and consequent small tension.

The formula which shows the relation between temperature changes and sags for an elastic wire is as follows:

$$a = \frac{I}{54cy^2}(d_1^2 - d_0^2) + \frac{3py}{2ecs}\left(\frac{I}{d_0} - \frac{I}{d_1}\right) \qquad (3)$$

when sag is expressed in inches and span in feet. In this formula.

a = temperature variation for small change in sag.

t_0 = initial temperature.

y = length of span.

d_0 = sag at temperature t_0.

d_1 = sag at temperature t_1.

c = coefficient linear expansion per degree F.

e = modulus of elasticity. A term expressing the relation of amount of extension or compression of material under stress, to the load producing that stress or deformation. It is load per unit of section divided by the extension per unit length.

p = load per foot of wire.

s = cross section of wire in square inches.

By assuming small changes in the sag, successive values

of "a" may be found from which curves showing variation of sag with temperature may be made.

Variations of sag may be reduced to variations in length from formula:

$$L = y\,(1 + \frac{8d^2}{3y^2}) \qquad (4)$$

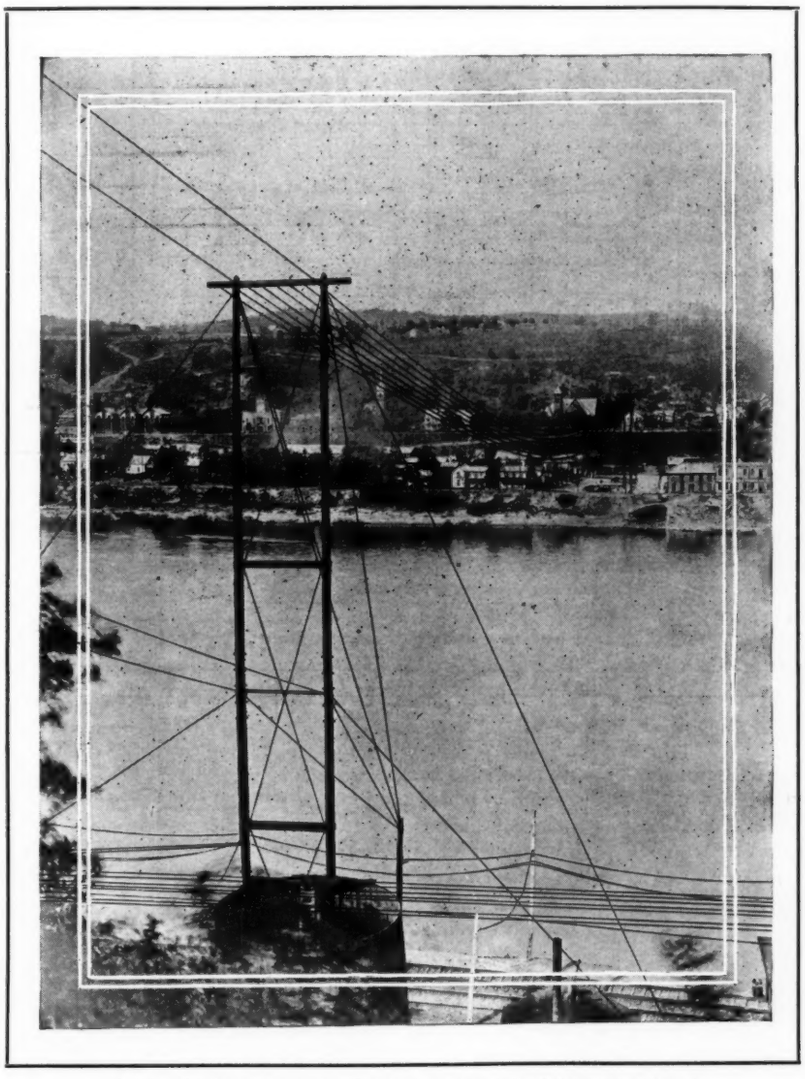
In order to show these relations I have drawn several curves, using as a base formulas 3 and 4, except for curve No. 4, which shows straight-line expansion curves for lead and steel when under no tension.

Curve No. 5 shows the relation between increase in length of messenger wire and various initial sags of 6 to 36 inches with temperature variations of 0 to 100 degrees. This is for a 200-pair 22-gage cable on a 16-M messenger, 110-foot span. For example, the increase in length for an initial sag of 6 inches for 100 degrees rise in temperature is only .025 inch, practically negligible, while under the same conditions with an initial sag of 30 inches, the increase in length would have been .7 inch, or 28 times as great. Curve No. 6 shows these relations in a different way, as the initial sags are plotted horizontally, and increases in length vertically for a series of varying temperatures.

It is clear from these curves how little variation is produced in the length of a tightly stretched messenger even with wide temperature variations.

In our standard practice, we specify a 30-inch sag for a 110-foot span. It may be assumed with safety that the daily variations in temperature will not exceed an average of 40 degrees, and a reference to curve No. 6 will show that above 30 inches initial sag, no material increase in length will be obtained for this temperature change. Consequently it appears that the standard 30-inch sag for this span is correct. In other words, with a 30-inch sag and average temperature changes, we realize 87 per cent. of the increase there would have been under a state of no tension in the messenger.

In case cables have been erected in the hot summer days, the reverse of the above expansion movements will take place. If dips have been left at the poles, cold winter weather will contract the lead cables and take most or all the slack out of the dips. On the other hand, if no dips have been left and the cable has itself been pulled up until no slack is left, the cold weather will have an extremely bad effect. This is because the cable will contract more than the messenger wire, and particularly so if it be a tightly stretched and elongated messenger, which will have the effect of taking the load off the messenger and throwing the major portion of the strain in the cable itself. Since a lead cable is easily stretched and deformed beyond its natural length by small stresses, under the above conditions the lead sheath will be permanently elongated and perhaps injured in many places. When the hot weather returns, this elongated lead sheathing will again expand at a higher rate than the messenger wire and show the familiar surplus of cable. The tighter the messenger is strung, the more aggravated will be these troubles.



An Ohio River Crossing—Poles Ninety Feet High Are Used.

Previous to the year of 1902, the practice in our company was to stretch the messenger wires very tightly and attach the cables closely to the messenger by means of marlin bands. This unfortunate method of cable erection marred what was, in most all other respects, an admirably designed and constructed aerial cable system of distribution. In the course of a few seasons, hundreds of breaks occurred, and when I came with the company, in 1902, it was one of the first problems passed to me for a solution.

It might interest you to know of some of the experiments we made at that time to determine the cause of the trouble. The general opinion was that the cracks were caused by the vibration of the poles and messenger wires, but both Mr. Snyder and myself felt sure that the principal trouble was due to expansion and contraction by temperature changes.

We placed a lead cable 67 feet long through rings on the roof of the telephone building. The cable had a 4-inch dip at one end, was fastened at both ends, but free to move along its length and expand into the dip. Around the cable we wrapped a resistance wire protected with a heat-insulating material. By passing current through the wire, we could raise the temperature of the cable to any desired degree. It was clearly shown that the cable was moved with temperature changes and that the coefficient of expansion was practically that of the lead sheath and not of the wires inside.

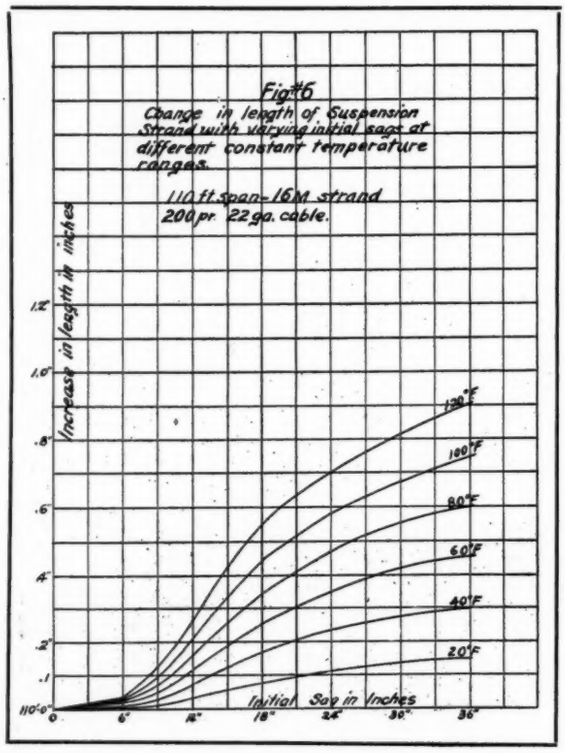
In order to determine the number of movements necessary to break the cable sheath in the average dip, a number of pieces of various size cables were bent with a dip of four

inches and subjected mechanically to a movement of one inch along the cable. When the movements were made by a fast arm motion, it was found that 50 to 100 movements were required to break the sheath of the cable. When the movements were very slowly executed by the arm, it took from 200 to 300 movements to crack the sheath.

The cables with the large diameters broke first, which was to be expected, since the angular opening at the surface of the sheath for a given movement would be larger because of the increased value of the radii. To make sure that the same results were occurring in practice, metal gauges were placed on existing cables to measure the increase in the dip and the movement of the cable along the span.

On many cables we were able to observe a daily longitudinal movement of the cable of one-half to three-quarters of an inch. All these experiments and tests prove very conclusively that our lead cables are constantly moving on the messenger wires because of temperature changes. We may without exaggeration imagine them to be alive and writhing and twisting about the supporting wires with the unceasing variations of heat and cold.

Unquestionably, because of these movements, aerial lead cables start to deteriorate from the day of their erection, and microphotographs of the molecular arrangement taken yearly would plainly show the changes in the molecular structure of the lead.



Curve No. 6.—Temperature Variation Effects on Messenger.

Another interesting phenomenon in overhead cables, is the effect produced by the difference in expansion rates of the entrained air in the cable and the lead sheath. Air has a greater coefficient of expansion than lead, and, therefore, when a cable is heated on a warm summer day, the air inside is compressed. If there be an opening anywhere in the lead sheath, the air will escape because of its compression; then, if a summer shower takes place, the cable is very suddenly cooled and the air inside will be rarified into a partial vacuum. This causes air to rush into the cable from the outside, and, as under these conditions there is usually water present on the surface of the cable, the water will be driven into the interior of the cable very rapidly and cause a serious case of trouble, which will take some time to locate and remedy.

In some of the older construction work, it was the practice to fill each joint with paraffine. In a few seasons it was noticed that nearly all these paraffine joints had a collapsed appearance. I believe this can be ascribed to the melting of the paraffine in very hot weather and its being driven each way into the cable by expansion. Then, if the cable was suddenly cooled by a shower, the paraffine would solidify and leave voids or vacuum pockets inside the lead sleeves. The outside air pressure would then force in and crumple up the lead sleeving.

A crystallization and cracking effect similar to expansion cracks is sometimes caused by the repeated blows of tree limbs.

Electric light and trolley crosses also play havoc with lead cables, and when a heavy arc is drawn, the lead will run in streams like so much water.

Lightning, as a rule, entering a cable does not burn large holes in the lead sheath, but the puncture is more like the hole made with a brad-awl or punch.

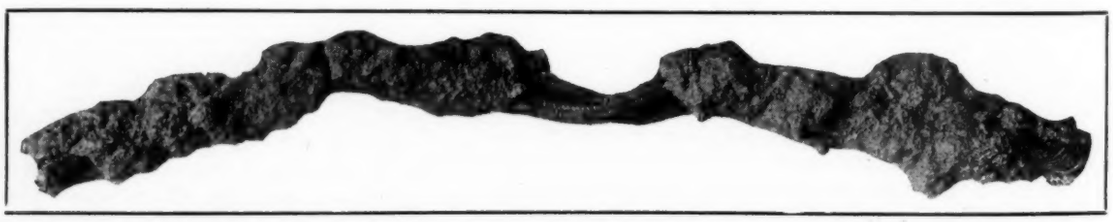
From time to time we have heard curious stories of various kinds of bugs and beetles devouring the lead sheath of telephone cables in California, Australia and other parts of the world. There seems to be no doubt that there are several species of beetles which, for some strange reason, have aspirations to build a home inside the sheath of telephone cables. I understand that in California they have actually caught the bug in the act, and the state entomologist is now engaged in looking up his pedigree and ancestors.

Lead cables placed in boxes over vibrating bridges have also been a frequent source of trouble. This trouble would naturally be expected on account of the susceptibility of lead to crystallization and cracking, due to repeated blows, which they would receive in such a position.

Many times, in looking over aerial cable construction, it will be noticed, particularly if the messenger wires have been tightly pulled, that some of the cables will have expanded so much as to force themselves above the messenger wires. It is puzzling to account for this large amount of excess cable unless we remember the elongation of the messenger wire that takes place under tightly stretched conditions. It has been shown previously that a messenger wire stretched very tightly did not materially increase in length for large temperature changes. The same effect will be produced in a tightly stretched messenger wire if some of the corners give way or the anchors loosen up slightly.

If the messenger wire had not been elongated, this giving way of the corner or anchor would produce no change in its length, but since the messenger wire is tightly stretched, when the corner gives way, the tension will be decreased and the messenger wire will increase in cross section. Its length will actually be decreased.

Since the cable was not elongated, it is apparent that, with the shortened messenger wire, we will have a surplus of cable which can only take care of itself by pushing around and above



Twisted Pair Coated with Steel from Bessemer Converter—It Broke With Its Own Weight After Years of Service

the strand. This phenomenon will also be observed when a splice is made in the middle of a section and the splicer's carriage and guy rope has stretched the messenger wire beyond its normal elongation. When the weight of the splicer and carriage is removed, the messenger wire will shorten and produce an apparent increase in the length of the cable.

In conclusion, when we stop to consider that the lead telephone cable was originally designed for use underground, where the lead could be quiescent, it is a marvel that our engineers, construction and maintenance men have been so successful in keeping operative the many thousands of miles of aerial plumbing throughout the Bell system.

I venture to say, however, that our present form of lead aerial cable is not the final answer to the solution of aerial distribution, but that in the years to come, we will have a much more flexible cable with a sheath capable of withstanding the mechanical shocks and temperature changes of overhead construction.

Finally, at the risk of tiresome repetition, I am again going to say that one of our most important duties is so to design and construct the overhead plant that while it serves its proper purpose in the giving of efficient and economical service, it will in appearance give the least offense to the public taste that every day is demanding more and more on the æsthetic side of the city beautiful.

A Suburban Trunk Cable.

Aurora Inter-State Now and to Continue Independent

Illinois Company, Whose Long Distance Lines Connect Chicago Automatic System with Wide Territory, Now Fully Reorganized—Interests Behind It Identical With Those In Central Home, of Louisville—Continued Independence Positively Assured

The reorganization of the Inter-State Independent Telephone Co., of Aurora, Ill., is now completed and the corporation is fairly squared away for business. Every outstanding debt has been paid, with the exception of a few hundred dollars, now being checked up. Bond interest is cleaned up to date and a large working capital is in hand.

The receivers have turned the properties over to an up-to-the minute management, competent to put the system in first class condition in every respect, and backed by an enviable record in the Independent telephone field.

The new owners control well over a majority of the outstanding stock. The Bell holdings are something over one half the bonds only. Under these conditions there appears to be absolutely no reason to doubt that the company will remain Independent and faces no chance of Bell control, now or in the future. To a representative of TELEPHONY, L. C. Griffitts, the general manager, said:

> The Inter-State company is Independent now and will remain so. There is no possible chance of, or reason for, its ever passing into Bell hands. The interests back of it, who have financed the proposition are identical with those behind the Central Home Telephone & Telegraph Co., of Kentucky. The latter is a holding company which controls the Louisville Home and a number of other local plants in that state, as well as a wide stretch of toll and long distance lines connecting them with each other and with the Independent lines in adjoining states.
>
> The Central Home is far ahead of the Cumberland Bell in Kentucky, both in number of stations served and in the quality of its service. It has met competition fairly there and has won the major portion of the field. Any talk of a sell-out there would be utterly absurd. Any suggestion of a sell-out here is equally so.
>
> In the Kentucky territory the capitalists who control the Independent company are spending thousands of dollars every year in improvements and extensions. They have appropriated thousands more for the purpose of building up the Inter-State system. If they entertained any thought of selling to their competitors they would certainly make no moves of this kind. I repeat, and I cannot make it too emphatic, the Inter-State is Independent and will remain Independent.

In the face of an unequivocal statement of this kind from one who is thoroughly conversant with his subject, there can exist no room for reasonable doubt. Outlining his plans for the betterment and extension of the properties, Mr. Griffitts continued:

> Every local plant of the Inter-State company is to be rebuilt, all the equipment is to be overhauled and brought to the point of highest efficiency. The long distance and toll lines are now being tested out and carefully gone over in order to make that branch of the business fully equal to the local service. When we have accomplished all we have set out to do we will have a system second to none for modern equipment and rapid fire service.
>
> Expert telephone engineers have been employed to go over the properties thoroughly. They will make a development study which will indicate along just what lines we should work to develop the system, what extensions should be built, and what economies may be effected. A firm of well known accountants is now engaged in perfecting accounting plans for us and we expect to have everything in smooth running order within a short time.

The financial reorganization taken care of, the physical reorganization will soon be under way. A more competent man to accomplish this than Mr. Griffitts it would be difficult to find. Entering the telephone field fifteen years ago, as a groundman for the East Tennessee Bell, at Knoxville, he has proceeded steadily upward along engineering lines, becoming thoroughly conversant with every branch of the telephone business—construction, maintenance, operation, traffic. He first became associated with the Louisville interests at Cairo, Ill., putting in the plant there. Four years ago he went to Louisville as assistant superintendent. Since that time, largely under the general management of S. M. Heller, he has been active in the operation and extension of the business in every department.

Mr. Griffitts is interested in a number of telephone companies in his former field, being vice-president and general

manager of the Seymour Mutual Telephone Co., of Seymour, Ind., and the Glasgow Home Telephone & Telegraph Co., of Glasgow, Ky., and treasurer of the Western Kentucky Long Distance Telephone & Telegraph Co. The Glasgow company operates in three counties and owns the Edmonton (Ky.) Mutual Telephone Co. The Western Kentucky is a purely long distance company. These interests he will retain and will also continue as consulting engineer for the Home Telephone Co., of Cairo, Ill., and as secretary of the Kentucky Independent Telephone Association. He has resigned as chief engineer of the Central Home company.

E. L. Barber, of Wauseon, Ohio, one of the best known men in the Independent telephone industry, and one of its pioneers, will be associated with Mr. Griffitts in the affairs of the Inter-State, the present owners of the company having been fortunate in securing Mr. Barber's services as special agent. He will occupy himself largely with the connecting companies and the relations between them and the Inter-State.

Fred A. Dolph, who, for the past twenty-one months has been managing receiver for the Inter-State company, and is to be retained by the new management as general counsel, has now actively resumed his law practice in Chicago, at his former offices in the Tribune Building. Under Mr. Dolph's careful guidance the Inter-State company was conducted through perhaps the most severe stress of its history.

During his regime the contract was perfected with the Illinois Tunnel Co. which made the Inter-State lines the first and, for a time, the sole long distance outlet for the Chicago Independent. He raised money for the betterment and extension of the Inter-State lines throughout Illinois and turned over to the new interests in control a property larger, better and stronger than it had ever been before.

Charles R. Peel, general superintendent under the receivership, will continue in that capacity. H. B. Crandall, formerly manager of the Knox County Home Telephone Co., Vincennes, Ind., has been retained as traffic manager. G. J. Beverly, auditor of the Inter-State, will remain in that postion. L. A. Ruud has been appointed traveling auditor. Other additions to the force will be announced shortly.

The officers of the Inter-State company are now as follows: President, E. J. Marshall, Toledo, Ohio; vice-president, George W. Walbridge, Toledo; secretary and treasurer, E. H. Cady, Toledo; general manager, L. C. Griffitts. The directors whose terms expire in 1912 are: F. W. Tracy, Chicago; Horace Manning, Chicago; C. N. King, Jersey City, N. J., and Mr. Griffitts. Those whose terms expire in 1913 are: H. D. Wagner, Hinckley, Ill.; E. F. Lawrence, Sterling; E. L. Barber, Wauseon, Ohio, and Mr. Cady. Those whose terms expire in 1914 are: Mr. Marshall and Mr. Walbridge; Adam S. Clow, Plainfield, Ill.; H. I. Shepard, Toledo, Ohio; and S. W. Ladd, Detroit, Mich.

The annual meeting of the stockholders has been called at Jersey City, N. J., on August 26. The company is anxious that all stockholders be represented either in person, or by proxy, in order that the situation may be thoroughly canvassed.

Changes in Staff of Central Home, of Louisville.

Following the resignation of L. C. Griffitts, as chief engineer of the Central Home Telephone & Telegraph Co., of Louisville, holding company for the Louisville Home and a number of other prosperous concerns in the state, a number of promotions and changes in office have ensued.

H. J. Jeffery, local manager at Paducah, has been appointed district manager for western Kentucky, with offices in Louisville. His field includes the Paducah Home, the Mayfield Home, the Marshall County, at Benton, and the Home exchanges at Marion, Providence, Salem and Clay, as well as the toll lines in the district. He is succeeded as local manager at Paducah by C. P. Short, formerly manager at Cynthiana.

C. B. Hatfield, general contract agent for the Central Home, whose headquarters have been at Paducah, has been transferred to Louisville.

R. H. Chambers, formerly assistant general engineer, is now construction manager, with offices at Louisville, having in charge all construction and engineering work for the associated companies.

Minor Corman, superintendent of equipment, is now manager of equipment for all the properties. J. H. Harris continues as traffic manager.

These will all perform their several duties under the direct supervision of S. M. Heller, general manager for the Central Home and its affiliated companies.

Mr. Heller is a remarkable man in many ways and one who commands the highest respect and admiration of his associates and friends, of which latter he has many. He came with the Louisville company in 1907, as auditor, continuing in this capacity for two or more years, when he accepted the position of general manager. It is largely due to his positive genius for the telephone business, coupled with an immense amount of initiative and power to accomplish things which he sets out to accomplish, that the Central Home group now dominates the telephone situation in Kentucky.

Kentucky Receivership Purely a Family Affair.

The Bourbon County Home Telephone Co., of Paris, Ky., has been placed in the hands of a receiver upon the application of the Central Home Telephone & Telegraph Co., of Louisville. The transaction is one which has no significance whatever except that it is a readjustment of the affairs of the company by its holding company. The Central Home owns all the capital stock of the Bourbon County company and also owns 96 per cent. of its bonds. The company is in splendid shape physically and financially. The receivership is merely the readiest means of straightening out a few complications in its affairs.

Moody Says Trusts are Increasing Despite Sherman Law.

Notwithstanding the so-called trust plans and the enforcement of the Sherman law, the industrial combinations have kept on increasing in size and number until their total capitalization is more than $8,000,000,000, so it is announced by John Moody a financial authority and editor of Moody's Magazine, a financial monthly.

"Moreover," adds he, "this astonishing aggregate does not include industrial concerns which are not trusts. There are thousands of manufacturing institutions enjoying the benefits of the tariff which cannot be included, strictly speaking, in any list of trusts. The government's federal corporation tax report for 1911 shows that the total capitalization represented by industrial concerns was about $26,000,000,000. This includes the many close corporations, concerns of small capital which, while industrial, are not trusts in the ordinary understanding of the term."

Mr. Moody says the evidence is clear that there is no truth in the idea that trusts bring lower prices.

"Industrial combinations, in the great majority of cases," he goes on, "have been formed primarily for the purpose of controlling or advancing prices to the consumer. While the theory has been persistently urged for many years that the main purpose of combination was to reduce producing and operating costs, and thus increase profits without the advancement of prices, the records shown during the entire trust era prove that such has not been the case."

Some Post-Mortem Affairs

"No Securities Wanted—World Over-Capitalized!"

By J. C. Kelsey

Our hind-sight is a wonderful faculty. If our fore-sight had 1 per cent. of the accuracy of our hind-sight, we would all be on "Easy street."

Every bridge-whist game has its post-mortem, and every base-ball game would have been won if "such and such" had been done!

I know men who claim they never make a mistake. But I also know that they never do or say anything.

They are post-mortem experts!

The financial world is indulging in a great deal of similar analysis. One would think this a time of great distress; that there was not a smile on the face of the earth; and that there was a sign hung in the window of every investor: "No securities wanted."

But, in the midst of this suffering, we have news of unparalleled crops! Railroads, telephones and telegraphs, banks and factories report unusual activity.

In spite of it all, the investor is unwilling to buy—stocks are at a standstill and bonds won't move at all! So say the croakers.

Post-mortem experts have been busy. These fellows can make no mistakes! But they do no good.

It was first declared that the security business was bad because the swiftly accelerating business of the country absorbed all the money.

But the bank reserves are just as high as ever, and the common borrower has just as much trouble to get the loan of a dollar.

But financial experts never hesitate long. I think it is a queer fact that financial experts are always poor. They can advise others, but they do not seem to reach their own local conditions.

Financial experts could not blame politics, so they have decided that the world is "over-capitalized." This is a very plausible reason. Every township, county, city and state are bonded to the limit.

The whole world has been crowded with securities. They are offered more swiftly than they can be absorbed. The consol of England has gone down in price.

It is supposed to be due entirely to the great debt of England. The French people have ceased to buy, the French debt is so big!

Russia does not know how much she owes—she keeps no books! And Germany is entirely broke!

Coming to America, the first thing you see is not the Statue of Liberty, but the great debt of New York City! This place owes more money than half the petty kingdoms of Europe. And the next thing the traveler sees is our great national debt, being piled up by the Panama Canal!

Everyone wants to borrow and those who borrow owe too much!

It's a terrible picture! If your own home city bonds are not selling (you know they are), you have a reason: "I can't buy a bond because of the great national debt!"

What a wise (?) reason! Most people quit buying stocks and bonds for a while because they had been stung once too often!

When you get right down to it, there is about as much childishness in financial circles as anywhere else.

A great chill is said to have chased up and down the financial spine when the real facts of Edwin Hawley's estate were brought to light.

Edwin Hawley was the gentleman who, with a shoestring acquired a pair of shoes, stockings, hat and suit, with his nerve! In other words, with a few miles of railroad built by innocent investors, and later his pawn, he acquired the Chesapeake & Ohio, the Katy and a half dozen other railroads.

He was reputed to be worth from twenty to forty million. At times, his brokers had deals on, which laid them liable to a loss of $5,000,000. When the man died, and his eggs were counted, he was found to be worth five or six million.

He had credit—that was all! And he had good luck! Had it been otherwise, he would have ruined nearly every broker on the street.

Edwin Hawley really did not know whether he had it or did not have it.

What is credit, anyway? It is based on other people's opinion of what you can do—and what the loaner hopes you will do.

A man who was recently drowned in two feet of water (accidentally) owed a Chicago bank nearly $700,000. And without collateral.

They, of course, looked him up. He had a bright, pretty automobile and his family had everything. Surely it would not take a detective agency to see that this man was a millionaire! So they loaned him the money.

One thing a bank will do—it will smile when it charges off those accounts!

So when the financial world finds that suckers have quit biting at their bait, they are surprised and try to figure it out. Don't worry—the suckers can not stay away!

And it is a false alarm about over-capitalization. When Alexander Hamilton suggested that the new government take up the states' debt of $30,000,000 which had been incurred in the 1776 revolution, there was a great howl.

You know there are some people who always think it will surely rain tomorrow. And there are others who positively are against everything!

That was an awful thing for Hamilton to suggest! The new federal government already owed $42,000,000, and the critics could not even see how this great burden could be carried.

Think of it! Sixty years later in our history, it cost our government $3,000,000 a day to fight the Civil War to a finish. It ran 1,300 days and did not break us, either.

Hamilton's proposition of saddling our country with a $72,000,000 debt made even Thomas Jefferson weep. It gave Aaron Burr a greater excuse to quarrel with him.

Today we have individuals who could pay our debt of 100 years ago, and plenty of corporations who carry enough cash to do so.

So we will have to dismiss the thoughts of over-capitalization.

Anyone with a few dollars can run a bond house. And the persons in it are not always responsible. The law will cover this, some day.

A bond is not always a bond, anyway. People buy bonds mostly because a slick salesman comes along, and always says he is buying a few himself, because they are so good!

The bond game, as it is run, is in so many ways an irresponsible and rotten game. And is based on the theory of killing the goose with the golden egg!

In olden times, a mortgage on our farm made us all sick with fear. And it made Santa Claus neglect the children every Christmas. He, too, was afraid to come too close. Today, some respectable outlaws will sell you a mortgage and you do the worrying.

No longer does old Scrooge loan us money and then make us miserable. Today, some one sells old Scrooge a real, first mortgage and gives him the horse-laugh! He could not foreclose any more than poor Shylock did.

Shylock could not shed any blood. Neither can the foreclosure of a modern mortgage hurt anyone's feelings. So he takes his medicine!

It is all a question of morality. If the banks who sell these gilt-edged securities would guarantee to buy them back at the price paid, under certain conditions, there would be no end of bond sales.

The world can absorb many more billions, and will continue to do so, but we need a sort of a blue-sky law to protect the innocent purchaser.

Kansas, alone, has a bureau for the examination of securities offered for sale. Every state needs one.

It is not the United Wireless and other grafts like mining stock without a mine, that need investigation. Investigation is needed on every offering of security advertised in Chicago or New York papers!

The queer idea in America is that there is plenty of money in Europe, seeking investment. Almost every enterprise has sent men to Europe, trying to rope them in. It seems that few succeed. Europe has its own troubles. The cost of high living is bothering them to death, too.

Germany is supporting a big army and over-grown navy. England is trying to build a battle-ship for every foreign one. France is also following—and Japan, too.

Let us be sensible! If we can't finance our affairs here, give it up. Save the cost of an expensive trip. European people are not suckers, any more than we are.

I remember well what a policeman told me years ago, while I was hunting work on the drainage canal. "Young man, if you can't get work in your home town, you won't find it here." That sage advice certainly will apply to finance.

While my policeman friend did not attempt to analyze my ambitions about work, I think he was generally right.

Possibly European financing is a grand and respectable thing. And there is a great deal of human nature about it, too.

Investors always like to weave romance into their investments. A city man buys a pecan grove in Florida. In his mind, he sees himself sitting amid a bower of roses, and dozing, with the hum of the busy bee in his ears.

No Chicago man would dream of buying Illinois land. He would rather pay a higher price for poorer land, farther away.

So it may be that pilgrimages to Europe will find fruit. Because things are always better farther on!

I know of some folks who are positively and deliriously happy over some land in the Florida everglades. Everyone knows that there is no way of draining this great marsh into the ocean. Suckers actually went out in rowboats to see their land, and paid big money for it, too.

In spite of all this, the dream of the uninformed buyer is still making him happy!

Ever since the money-changers were driven from the Jerusalem temple, there have been investigations and analyses to find out if a Jonah was on board.

Investigation is the fad of the day. Nothing can escape. I believe congress will investigate Henry Frick's billion dollar dinner to see if any gentlemen's agreements were made.

The government dictagraph is listening to every thing that looks like money. The Stanley committee roasts the Morgan crowd for making $700,000,000, and for crowding Andy Carnegie out of business. No one seems to be satisfied!

It's a great old world, anyway. A rich man is likely to be confined in an insane asylum, when he gets old. His children usually need the money!

A poor man merely draws the poor-house. His children don't need him! Nature always evens up!

Let those of us who are in a fair condition of health, try to escape the worries of bond dealers and money-changers. Merely be careful with your diet, this hot weather.

Keep your conscience clear and happiness will be yours. At least the little boy's copy-book says so.

By the way, even the humble milk-man is having his troubles. They threaten to take his hydrant service away and break his bottle of formaldehyde.

Bad milk kills thousands of babies annually. But that really should be no excuse for disturbing business!

This is a peculiar year. The weather has made us irresponsible. It has even given us a third party!

MORAL:—Anything for an excuse!

Chicago Independent Announces New Connections.

The Illinois Telephone & Telegraph Co., of Chicago, successor to the telephone business of the Illinois Tunnel Co., is announcing to the public that it has recently cut into service its new long distance copper circuits to Grand Rapids, Mich., and St. Louis, Mo. These new connections, it is stated, will very shortly give the company leads into points beyond St. Louis, in Missouri, and a great many more points in Michigan.

The company now has direct circuits to such points as Elgin, Springfield, Bloomington, Peoria, Aurora, Joliet, Sterling and South Bend as well as scores of smaller places. The transmission is good and the service rapid. The company allows either a five minute initial period to all points or a reduction under the prevailing Bell rates. In addition to this, it has a night, Sunday and holiday rate.

Bell Not to Absorb Rural Canadian Lines.

L. P. McFarlane, managing director of the Bell Telephone Co. of Canada, has announced that there is no truth in rumors now about to the effect that the Bell company is preparing to take over rural lines throughout Ontario and Quebec.

A Quartet of Men Prominent in the Telephone Field

EDGAR D. GLANDON, owner of the Pittsfield (Ill.) exchange and secretary and manager of the Pike County Telephone Co., of Pittsfield, Ill., was born in Schuyler county, Ill., November 19, 1869. He attended Knox and Eureka Colleges and the University of Illinois. The opening of the Independent telephone field caused him to abandon further study and to enter the telephone business, which he did as assistant manager of the Western Illinois Telephone Co., having charge of its construction for a time. In 1896, Mr. Glandon removed to Pittsfield and built the Pittsfield exchange, later organizing the Pike county company. Aside from the development in Pike county, he built exchanges at Havana, Whitehall and other places. He is a member of the executive committee of the state association, and treasurer and managing director of the Illinois Toll Clearing House, with offices in Springfield. His farming interests are even greater than his telephone holdings. Mr. Glandon is a firm believer in the application of modern business principles to the farm.

A. F. ADAMS is assistant to the president, general manager and engineer of all the telephone properties comprising the Gary System, of which Theodore Gary is president, located in Missouri, Kansas and adjoining states. His offices are maintained in Kansas City, Joplin and St. Joseph, Mo. He is also secretary of the Telephone Securities Co., which took over control of the Kansas City Home in the early part of 1912. Mr. Adams, who was born in Berlin, Wis., January 3, 1881, is not a university graduate. His engineering education was acquired in home study and correspondence school courses. He began work as repairman in 1897 for the Waushara Telephone Co., in Berlin, Wis., finally becoming its superintendent. Later he occupied positions of importance with a number of other Independent companies in Wisconsin and Illinois, finally affiliating himself with Mr. Gary, at Joplin, in 1905. He has been active in state association work. He believes in rates sufficiently high to make the business pay a profit, and has raised rates for every company he has been connected with. He is an Elk.

RICHARD VALENTINE, secretary and general manager of the Rock County Telephone System, Janesville, Wis., was one of the early pioneers of the telephone art. He was born in New Orleans, La., June 9, 1847. He attended the public schools of Ithaca, N. Y., and, later, the Woods Telegraphic Institute, at Syracuse, N. Y. In 1878, he was appointed northwestern agent for the American Telephone Co., and in that year built an exchange at Dartford, Wis. This, Mr. Valentine states, was, so far as he has been able to ascertain, the first telephone exchange built in the country. In 1870 Mr. Valentine founded Valentine's School of Telegraphy, of which he was president from that time until 1909. He has always been active in both state and national association work. He has served as president of the Wisconsin Independent Telephone Association for six years and is still holding that office. For three years he has been a director of the National Independent Telephone Association and was elected its secretary and treasurer at the annual convention in 1912.

PERRY C. HOLDOEGEL, secretary and general manager of the Central Mutual Telephone Co., Rockwell City, Iowa, was born in Woodbine, Iowa, September 7, 1869. He attended the Woodbine Normal School and later pursued his studies in private classes. He was engaged in public school work for fourteen years and was three years principal of the Calhoun County Normal School. He is a director of the First National and the Rockwell City Savings banks. Mr. Holdoegel owns "Chesterplace," a large stock farm adjoining Rockwell City, and is also interested in wheat ranching in Alberta and cattle ranching in Wyoming. He organized the Woodbine Telephone Co. in 1893 and the Central Mutual company in 1895, having managed the later since it was formed. He has been three times president of the Iowa Independent Telephone Association and twice president of the district association. He has served as first vice-president of the International Independent Telephone Association, and later as acting president. He is a Knight Templar and a Shriner.

Cases and Discussions Concerning Public Relations

This Department Has Been Established as a Regular Weekly Review of Proceedings Before Courts, Commissions or Civic Bodies—Communications Relating to This Branch of Work are Invited from All Persons Interested in Past Cases, or Those to be Heard in the Future

Detroit Merger to Conserve Independent Interests.

With but one exception, all opposition to the proposed merger of the Bell and Home telephone systems in Detroit and Wayne county, Mich., was withdrawn by the Independent managers when the hearing was held before the Michigan State Railroad Commission. Their attitude was the result of an agreement reached with the representatives of the Bell company relative to the terms of the order the commission is asked to issue authorizing the merger.

A committee representing all parties interested drew up the document, and now it is up to the commission to decide whether or not it wishes to issue the order permitting the merger. The opposition came from the Grass Lake Telephone Co., which argued that there is nothing in the law permitting such a merger.

It is claimed that if the order is granted it will fully protect the Independents, as it provides that they are to have the benefit of connections with the amalgamated system. Not only that, but Bell subscribers in Wayne county are to be allowed to use the Independent toll lines out in the state, if desired.

The agreement also says: "The rates to be hereafter charged for service given to the patrons of the Michigan State Telephone Co., in the city of Detroit, shall not be raised as the result of the purchase hereby ratified beyond the present schedule filed with the Railroad Commission, unless leave to do so is expressly granted by the said Railroad Commission after application, according to the law."

"Public Convenience and Necessity" in Ohio.

The Ohio Public Service Commission recently ruled that permission should not be granted the Cranberry Home Telephone Co. to enter and establish an exchange in New Washington, Ohio. The application was opposed by the Local Telephone Co., which declared that it was then giving and had been giving adequate service in the town and that there was no occasion for another company to enter the field. The commission ruled, in part, as follows:

> After considering the pleadings and the argument of counsel, hearing the evidence, examining the exhibits and making such further inquiry and investigation as the commission deemed proper, the commission finds that the public convenience does not render it necessary and proper, and neither necessary nor proper for the said Cranberry Home Telephone Co. to exercise any license, permit, right or franchise that said company may have obtained, secured or acquired, to own and operate a plant for furnishing telephone service in the village of New Washington.

The petition was therefore dismissed. Members of the commission say that the ruling cannot be regarded as indicative of the intention of the body to restrain competition in the telephone business. They say further that their action was without regard to any telephone merger negotiations or probable negotiations, but that it was based entirely upon the conditions in the village of New Washington which made an additional telephone system unnecessary and gave no promise that such a plant would be able to earn sufficient to maintain proper service and provide for replacements and improvements.

Courts Will Settle Hamilton Home Case.

It is practically certain that the issues between the Hamilton Home Telephone Co. and the Cincinnati & Suburban Bell Telephone Co. before the Ohio Public Service Commission will have to be finally determined by the courts. The former company is seeking to have the commission compel the latter company to give it physical connections. Legal questions involved in the case have been referred to the state's attorney general, T. S. Hogan. Several hearings have been held by him in an effort to unravel the relations existing and sought.

The principal question in the case involves the construction of section 66, of the public service commission act, which is sought to be invoked by the Hamilton company to obtain through service into Cincinnati over the Bell lines.

The Bell companies hold that the exchange of service provisions do not apply. They contend that the section involved is to be construed literally and, under its provisions such an exchange of service as the Hamilton company wants is not to be ordered by the state. On behalf of the Hamilton company, Judge Allen Andrews, of Hamilton, urges that the act is to be construed broadly and that the spirit of the statute rather than the letter should rule.

The decision of the attorney general is expected soon, but in any event the case, it is promised, will be carried into the courts, if not on the interpretation of the statute, then on the constitutionality of the provision in the law for exchange of service.

Commission Authorizes Kentucky Telephone Merger.

The Kentucky Railroad Commission has approved the consolidation of the Cumberland Telephone & Telegraph Co., the Hopkinsville Home Telephone Co., the Pembroke Home Telephone Co. and the Todd County Home Telephone Co. The properties are located in Todd and Christian counties. They will be operated henceforth as the Christian-Todd Telephone Co., the incorporation of which was recently noted in these columns.

Will Not Require Par for All New Securities.

The Ohio Public Service Commission, which for some time has stood firmly on the position that it would not authorize the issue of bonds and stocks by Ohio public utility companies, except at or near par, has evidently had a change of heart. New York bond houses, interested in Ohio corporations, say that hereafter it is expected that the commission will be much more liberal in regard to the prices at which new securities may be sold, says the Wall Street Journal.

Announcement is made that the commission has authorized the Lake Shore Electric to sell $116,000 of its first mortgage 5 per cent. bonds at 85. The application to sell these bonds had been twice rejected by the commission. The company some weeks ago asked permission to sell $56,000 bonds at 80. This request the commission refused. The company then took the question to court. A third application was made after a conference with the commission and the issue of the $56,000 was authorized at 85, as well as that of $60,000 additional for which application also was made.

The commission also approved the issue of $1,385,000 5 per cent. first mortgage bonds, and $50,000 stock, of the Columbus, Kenton & Toledo Traction Co. The bonds are to be sold at 80 and the stock is to be sold at par. This application also had been refused when previously made

and its approval indicates quite a change in position on the part of the commission.

Care for Floating Debt Before Stock Dividend.

The Ohio Public Service Commission has refused its consent to the issuance by the Elyria Telephone Co., of Elyria, Ohio, of $27,000 stock, to be distributed to its stockholders as a special stock dividend. The reason given for withholding permission for the issue for this purpose was that the company has outstanding floating indebtedness of approximately $29,000, for which the commission held some provision should first be made. The ruling stated:

> After considering the pleadings, hearing the evidence, examining the exhibits and making such further investigation and inquiry as the commission deemed proper, and it appearing that said company now has an existing floating indebtedness of approximately $29,000, for the funding of which by an issue of capital stock or bonds no provision has been made, the commission is of opinion that said company should discharge its floating indebtedness by the payment of the same with the proceeds arising from the issue and sale of capital stock or bonds before increasing its capital obligations with an issue of capital stock which is to be distributed among its present stockholders as a dividend.

The consent and authority of the commission to the proposed transaction was, therefore, withheld.

Plan to Assess Public Service Companies.

Portland, Ore., street car, gas, telephone, telegraph and electric light corporations will be required to pay a proportion of all costs levied against the taxpayers of the city in future for grading and sewer improvements, if the plan suggested by A. L. Barbur, city auditor, meets with approval by the city attorney.

Heretofore the cost of grading and sewer improvements has always been assessed against abutting property owners, no portion being charged against corporations which, it is pointed out are benefited by such improvements.

Mr. Barbur has asked the city attorney to investigate his proposition and to deliver a written opinion as to the legality of the plan.

Sues to Set Aside Commission Ruling.

The Interstate Telephone & Telegraph Co., of Trenton, N. J., has started a suit in the supreme court against the Public Utilities Commission to compel the board to grant permission to the company to issue $1,250,000 thirty-year, first refunding mortgage 5 per cent. gold bonds. The Commission refused its permission on July 9.

Cases Before Oklahoma Corporation Commission.

Among the cases set for hearing by the Oklahoma Corporation Commission, at its August term, beginning August 13, are the cases of the Prague Telephone Co. vs. the Wilzetta Telephone Co., asking for connections between Prague and Arlington; and F. E. Clayton and others, of Chickasha, against the Pioneer Telephone Co., alleging discrimination in rates.

The Fort Supply Telephone Co. has filed a complaint with the commission alleging that the Home Enterprise Telephone Co., of Woodward, is not giving the patrons of the former company adequate long distance service under the recent order of the commission requiring physical connection. It is claimed that one wire has been connected under that order, but that it is not enough to handle the business and the Fort Supply company now wants a second wire. The commission has set the case for hearing at Woodward, on August 10.

The Fort Supply company has been extending its lines into Beaver county and claims that it needs better service on that account. The Home Enterprise company makes long distance connections with the Pioneer company at Woodward and with the Southwestern, at Higgins, Texas.

The Fort Supply company has also applied to the commission for permission to make a change in its charges to subscribers of the exchange at Buffalo. It proposes to change the rates from $1 to $1.25 for residence telephones and from $1 to $2 for business service.

New York Commission to Decide Rate Question in Buffalo.

When a franchise was granted to the Frontier Telephone Co., of Buffalo, N. Y., in 1901, little was known of the real value of telephone service, and the cost of it in large cities. Even the Bell company, after some eighteen to twenty years of operation, had but a small system in Buffalo, serving about 5,600 subscribers. The rates in the Frontier franchise were, therefore, fixed at what has proven to be a very insufficient schedule for the service rendered, and the Frontier company has labored under a serious disadvantage during the past ten years.

Two years ago, when the Public Service Commission took charge of telephone rates, service and general supervision of this business, it was felt that an arrangement could be made for reference of the whole question of rates of charges for a city such as Buffalo to the Public Service Commission without regard to previous franchise limitations.

During the past several months this question has been under discussion with the city authorities, and these discussions have now culminated in the passage of the following resolution by both franchises of the city council which has been signed by the mayor:

> That either of said companies (Frontier or Bell) is hereby authorized to bring a proceeding before the Public Service Commission, second district, to consider the whole question of just and reasonable rates for telephone service to all users of its service within the city of Buffalo without regard to franchise limitations, and the city consents that said commission may, without regard to the provisions of any franchise as to rates, fix the just and reasonable rates to be thereafter observed and in force as the maximum for a specified service to be charged such users; and that until the decision of the said commission in such a proceeding the service of such company to city offices be continued on the terms fixed by contracts hereby authorized which contracts are to be expressly subject to this condition.

The Federal Telephone & Telegraph Co., in its control of the Frontier property, is now permitted to appear before the same tribunal as its competitor in the matter of rates, with the assurance that a fair charge for service will be allowed by the Public Service Commission regardless of previous franchise limitations.

The passage of this resolution was attended with little or no criticism, and the good feeling toward the Federal company on the part of the general public in this regard is worthy of notice.

The company has not determined as to its plans in regard to the resolution, but it is assumed that an early application will be made to the Public Service Commission to adjust the rates for telephone service in Buffalo, both for the Bell and the Federal. For the first time in the history of the Federal company's operation in Buffalo, therefore, its right to make a fair rate of charge for its services will be acknowledged.

New Voting Trust for Keystone.

The Keystone Telephone Co., of Philadelphia, is reported to have virtually completed arrangements for an extension of the voting trust for the common stock, for five years from July 1. It is said that about 55 per cent. of the stock has been deposited under the new agreement. Definite announcement may be expected soon.

Sparks from the Troubleman's Department

On Abolishing the "Hello."

"This here is going some," said Spiegel, the cigar dealer, as he blew smoke between the leaves of his favorite paper. "It says that the telephone companies everywhere are declaring war on the word 'Hello!'"

"Hello! What's all this?" said Taxi Tim, the gasoline philosopher, coming out of his dice box soliloquy. "You say the 'phone bosses and viziers declare the 'hello' must go? Maybe they want to eliminate the first syllable in the name of propriety. The second syllable doesn't amount to much when you come to figure it up. But if this is so, I trust the wire wizards have landed on a suitable substitute, something less formal than 'Hey!' and more endearing than 'Fly with me, dearest little Angelface.'"

"No, it doesn't say," furnished Spiegel after a second look.

"Then they'd better rub the dust off the transmitter and try again," declared Taxi Tim. "They'll certainly need a substitute expession. When the average subscriber gets on the wire, all dressed up in his telephone voice he's simply got to make some sort of an opening chirrup. It's quite as important as a nickel that will fit. If for nothing else he needs it to clear his throat.

"If the hellophobes can't book anything from the English language to be understudy for 'hello,' they'd better resort to the foreign languages. They might try the German 'Guten morgen,' or the Hawaiian 'Aloha,' or the Hindu 'looka here.'"

"Those 'phone fellows say 'hello' wastes time and costs money," said Spiegel.

"That's a funny conclusion to be drawn by those who have decreed that talk shall not be cheap," observed the chauffeur. "At least the greeting, 'hello,' isn't as dear as the 'dear sir' that a tailor's bill always steps off with. No, I'm for the retention of 'hello' in our nickel-first vocabulary.

"For the student of psychology and human nature, the telephone 'hello' is invaluable for study. The vocal noising of the word 'hello' is a separate study, standing over here all by itself. There are as many kinds of 'hello' as there are peanut variations in a vegetarian restaurant. To dig up an old tune that is still having a popular run in Petroleum Dell, Ariz., every little 'hello' has a a meaning all its own.

"For instance there's the sweet, saccharine 'hello' used by Bella, the middle-weight champion heart-breaker of her high school alumni association. Oh, it sounds cute: First the telephone bell rings and she dashes downstairs like a fireman on the heels of the second gong. Her 'hello' to the young pegtop on the other end of the wire sounds as if it were tied up in florist's ribbons. If you don't think lump sugar can be forwarded by wire you'd better consult little bell-voiced Bella, the girl with the silvery tone-t 'hello.'

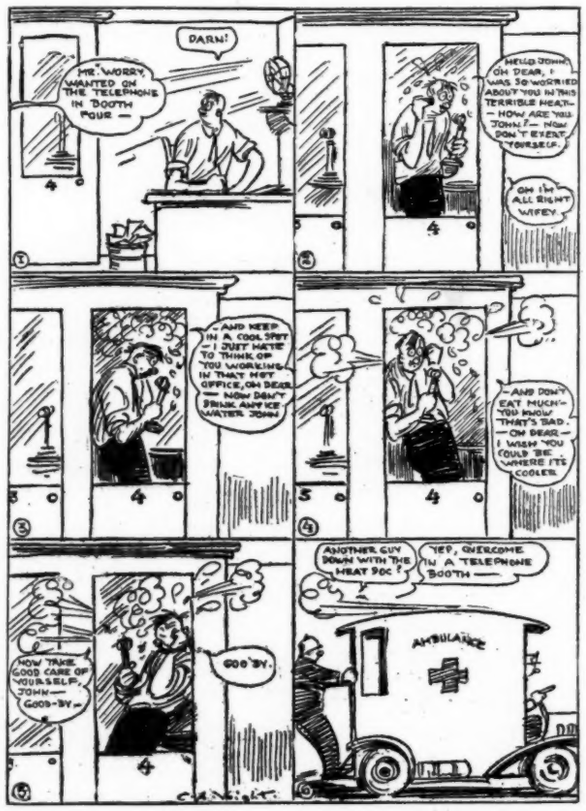
"Then there's the painful, guilty 'hello' that Mr. Husbanjohn comes loose with to Mrs. Husbanjohn as he stands in the corner of the club grille, with the 'phone receiver in one hand and a Kelly pool lance in the other. It is past the hour that supper cooleth, and he answers her with a 'hello' that listens as pale as the chalky end of the cue.

"Then there's the breathless, panting 'hello' of the stock broker who's trying to get a quotation on Edible Asphalt, preferred, and the genial snarl of the theater box office man, and the nice, chatty 'hello' of Mrs. Grabberdean, who intends to loll on the party wire all afternoon, although she really hasn't got time to come to the house, and the dry, thick, octavo 'hello' of the hotel guest with the morning hangover, and the——."

"Do you think they ought to preserve 'good-bye' too?" mercifully Spiegel.

"I'm personally strong for 'good-bye,'" said Taxi Tim. "But some long-winded wire conversationalists seem to be saving it up for a rainy day." —Gene Morgan in Chicago Record-Herald.

MRS. WORRY


DARN!
MR. WORRY WANTED ON THE TELEPHONE IN BOOTH FOUR —
HELLO JOHN! OH DEAR, I WAS SO WORRIED ABOUT YOU IN THIS TERRIBLE HEAT— HOW ARE YOU JOHN?— NOW DON'T EXERT YOURSELF.
OH I'M ALL RIGHT HAPPY
AND KEEP IN A COOL SPOT — I JUST HATE TO THINK OF YOU WORKING IN THAT HOT OFFICE, OH DEAR — NOW DON'T DRINK ANY ICE WATER JOHN
AND DON'T EAT MUCH— YOU KNOW THAT'S BAD — OH DEAR — I WISH YOU COULD BE WHERE IT'S COOLER
ANOTHER GUY DOWN WITH THE HEAT POC?
YEP, OVERCOME IN A TELEPHONE BOOTH —
AMBULANCE
NOW TAKE GOOD CARE OF YOURSELF, JOHN— GOOD-BY —
GOOD BY.

—C. A. Voight in Chicago Record-Herald.

"Last night, after I'd caught the soap for the second time in the bath-tub, there came an insistent ring on the telephone," says a contributor to the Chicago Tribune. "I was alone in the house, and as I was expecting an important telegram I dashed for the telephone in a cloud of silver spray. When I picked up the receiver all I got was: 'Sorry; I rung you by mistake.' Says I 'You didn't wring me at all; I'm still dripping.'"

Vacation Time.

Slowly treads the office boy, a strange gleam in his eye, the janitor has blossomed in a suit of summer clothes, a troubleman is missing, we're an operator shy, a collector has a suit case, yet we know not where he goes. The president is absent, one stenographer is gone, the treasurer has left blank checks behind, and though the cashier still remains, her cheeks are growing wan and the auditor has something on his mind.

The rural general manager is oiling up his car, the contract boss has hooks and lines galore, the voucher clerk is missing where the vouchers always are; chief counsel doesn't come here any more. We're sticking to the good old ship; perhaps our crew is small; we haven't time for metered measured rhyme; we expect the absent treatment will surely cure us all, of the maladies around vacation time.—B. E. Cooney, in the Automatic Telephone News.

An observant newspaper writer has found that there are sixty-four Beans in the Boston telephone directory.

Department of Railway Telephony

The First of a Series of Articles on Telephone Dispatching by J. A. Kick, to Appear in the Second and Last Issues of Each Month—They Will Take Up Practical Matters Connected with Dispatching Circuits, Installation of Equipment, Operation, and Maintenance

The Development of Selective Systems.

The selective signal systems of today range from the four-party harmonic subscriber's line in commercial service to the unlimited party line in railway dispatching and message service.

The limiting factor to development of a telephone system for the required mileage and number of stations, has been the transmission losses due to the signaling equipment in the systems used, that is, the bells across the line which could not be made of sufficient impedance to effectually keep down the transmission losses without reducing the ringing efficiency.

On magneto lines of ten to fifteen stations there has always been more or less dissatisfaction owing to code rings, which are both confusing and annoying. Generally poor service has resulted, due to parties failing to distinguish a certain signal from the general clatter of a multiplicity of long and short rings. Commercial service made little demand for party lines of appreciable length or of a considerable number of stations, so that the problem was not until recently given the attention necessary to develop the present selective signaling systems used in train dispatching.

The circuit details and mechanical devices in connection therewith, are so very simple as to cause wonder at the tardiness of the arrival of such a clever method of direction of train movements, but here is where we can apply "Necessity is the mother of invention."

Almost every old time telegrapher has invented a set of single line telegraph repeaters and yet there are only two or three really successful mechanisms in service. So it will likely be with selective systems, a number of fairly good systems will be devised, of which two or three will lead, with perhaps one that has little more to be desired in speed and efficiency.

The first step appeared to be the securing of some means of signaling the operating mechanisms which could be so placed in the circuit as to minimize the transmission losses. This was found to be rather easy of solution by the application of a direct current for signaling impulses. A method by which the signal receiving relay coils were in the two line wires serially, was tried but was replaced by bridging the signal receiving relay across the line. In the series method, a low wound relay was used, while by the bridge method, a high wound relay was considered more desirable. This high wound relay proved advantageous in keeping down transmission losses by reason of offering considerable impedance to voice currents.

With the gradual increase of mileage on old and new circuits, it became apparent that the ordinary transmission circuit was not efficient enough to prevent troublesome interruptions to service, due to too many instruments across the line at one time, thereby seriously cutting down transmission and especially between the terminal stations. Two serious faults were found in the circuit, both of which contributed to the transmission losses. One was insufficient impedance in the direct current signaling bridge. The other was a transmission circuit of too little volume outgoing and of not sufficient effective ohmic resistance to prevent several of these receiving circuits offering what was comparatively a low resistance short path across the line. These faults so reduced the transmission from terminal to terminal as to indicate that improvements were absolutely necessary to success.

Special impedance coils were designed for the service. When of sufficient value they were found to increase the transmission as well as to improve the generator ringing which was used to signal the master station. But the most serious trouble was not yet overcome and attention was then turned to the transmission system, with the result that several methods were devised, either of which was an improvement.

The result of the improvement system is to provide such volume and quality of transmission as to entirely remove the wire mileage and limited station number factors, leaving only the factor of the capacity of the dispatcher and the message operator.

It has been said by a so-called authority on such systems, that the impedance coils in the selector bridge are unnecessary and while this is an opinion allowable to any one who chooses to express it, yet it does not quite agree with good practice, i. e., to prevent all losses and attempt to secure the best results obtainable. There is no denying that the presence of extra impedance coils in the selective bridges will somewhat reduce the speed of any of the present high speed systems of selective signaling, but the reduction in speed is scarcely appreciable, while the improvement in transmission is quite noticeable.

Of course it is known that some argue that this and that is good enough, at the same time admitting the possibility of improvement. This basis they apply to train dispatching circuits for transmission, while they do not allow a good healthy margin for unfavorable conditions under which a dispatcher must at times work or abandon the circuit. The circuit with the greatest operating margin, both from a transmission and signaling standpoint, is the best for train direction and to the end that it be made such, no avoidable losses should be allowed.

Every argument for and against methods of operation, classes of equipment and standards of efficiency, certainly had some reason for its presentment. One side may be taken by theory, the other by practice; still another may be one side operative and the other constructive. Then again there might be a commercial side of vital importance.

The transmission on any given dispatcher's circuit can be first class or just passable; and so it can be with the selective system, all depending upon the equipment used. One railway line of forty-five miles is now and has been dispatched by telephone for twenty-five years. During all this time a grounded telephone circuit has been used and considered satisfactory, indicating that the quality of the circuit often depends upon the requirements of the user.

Our present day selective systems are the result of the indefatigable work of the inventive minds of a large number of theoretical and practical men. They turned a deaf ear to the chronic pessimist who can never see any good in anything new, especially when its adoption means a direct departure from the "old way." Some systems which theorized beautifully, proved miserable failures in practice. While in these particular cases, the desired ends were not secured, an entire loss was not experienced as the failures proved what a successful system should not be, if nothing else. Some systems while proving failures as a

whole, demonstrated the efficiency and general reliability of some one or more parts of the system and furnished the nucleus for assembling a second system along the line of advancement.

The inventive and construction work in connection with the selective system has not been nearly so trying as has been the discouraging necessity of convincing the user that a great advancement has been made in the methods of handling dispatching and message work. This too in view of the fact that a large number of practical demonstrations have been at hand.

There are several selectors now on the market using central energy current for operation and ringing. Two or three use local battery for stepping up the mechanisms and for ringing. The main battery of the latter system is only required to close a light armature relay in the local circuit and can therefore be very small in comparison with that of the central energy systems.

For proper operation of the central energy systems, at least, six milliamperes must be furnished per selector and effectively distributed, and the usual specifications call for ten milliamperes per selector to provide sufficient margin for battery deterioration and line losses.

As the main line relay is operable down to somewhat under one milliampere, it can be readily seen that the circuit with four mils normal operating current has a wider margin on the low side than the one with ten mills normal and six mills the lowest current allowable. In addition to this is the undeniable fact that the required current for forty stations at ten milliamperes per station, or four hundred mills at three hundred and eighty-five volts, would more readily break down insulation than forty by four or one hundred and sixty milliamperes at two hundred and twenty-five volts. With the selective bridge of the same retardation in both cases the reduction of current possible by using the relay selector would increase the speed of operation, unless it was preferred to add a retardation coil in the selector bridge to secure the maximum transmission and generator ringing efficiency.

While the retardation coil in the selector bridge effectually excludes all voice and generator currents and gives maximum efficiency in the talking circuit, there is present in the selective circuit, the coil discharge interval which causes the relay to slightly lag. The speed is therefore no greater, in fact it is slightly less than the central energy system without the coil and very appreciably lower than the relay type minus the coil. With such a material reduction of main battery, it is quite possible to reduce the number of coils and condensers formerly used at the dispatcher's station. This reduces the coil discharge impulses audible to the dispatcher, as it follows that, for a given capacity, the amount of damping equipment should decrease in some ratio as the decrease of the voltage.

There are a number of points on which authorities do not agree, both in regard to transmission and signaling, but there is little chance for an agreement as the standards for both are set by the user. As there is a wide variance between the adopted standards, there is little common ground.

New York Central Extending Telephone Train Dispatching.

A Watertown, N. Y., paper is authority for the statement that the telephone will soon supersede the telegraph as a means of dispatching the trains on the Black River division of the New York Central lines. It is planned to install the telephones over the Black River line from Philadelphia to Utica in the near future.

All trains on the St. Lawrence division, running from Watertown to Massena and Ogdensburg, are now dispatched by telephone, while other railroad business is done by telegraph. Railroad officials say that the system contemplated for the Black River road is more flexible than the former method.

Telephone for Another Division of Central of Georgia.

An up-to-date selective telephone system for dispatching trains is practically assured for the southwestern division of the Central of Georgia Railroad. The telephone dispatching system has been tried out between Macon and Atlanta, and between Columbus and Birmingham. It has proven so satisfactory that the management has recommended the system for the southwestern division, which includes that section between Macon and Columbus and Macon and Albany. The road is considering the installation of the system between Macon and Savannah.

Albany's Combined Fire Alarm and Telephone System.

Superintendent William B. Martin and linemen of the fire alarm bureau, Albany, N. Y., are engaged in installing in the 239 fire alarm boxes throughout the city, a telephone jack, the invention of Superintendent Martin. When the work is completed, it is believed that Albany will be the only city in the country with a fire alarm signal system equipped so as to be used both for signal work and for telephoning. The installation will enable Chief William W. Bridgeford and his assistants to communicate directly with headquarters from the nearest signal station during the progress of a fire. Manufacturers of signal boxes have heard of Mr. Martin's invention and a number of them are in communication with him in regard to the rights for the extensive manufacture and sale of the new jack. For the talking set Mr. Martin has selected the Dean company's pocket transmitter and receiver which Chief Bridgeford and his assistants carry as part of their fire fighting equipment.

New Switchboard at Monticello, Wisconsin.

The United Telephone Co. recently installed a new 300-line two-position switchboard in its exchange at Monticello, Wis. One of the features of the new board is the night alarm system, using two alarms arranged to ring on both or either of the two positions. One alarm rings only as long as the subscriber rings central and the other rings until the operator cuts it off by making the desired connection. A lighting trough reflector, similar to those used on common battery boards, extends the full length of the board. The cord circuits are equipped with repeating coils for double supervision.

The specifications for the board, which was furnished by the Dean Electric Co., were drawn up by P. J. Weirich, the company's general superintendent and W. R. Sherrich, manager of the Blanchardville exchange.

Atchison Rates Fixed.

Formal acceptance by the Missouri & Kansas Telephone Co. has been filed with the city clerk of Atchison, Kans., of the ordinance which fixes rates as follows: Business telephones, single line, $3; two party lines, $2.50; residence telephones, single party lines, $1.50; two party, $1. It is understood that the Missouri & Kansas company will take over the Atchison Telephone Company's plant on August 14.

May Agitate for Municipal System in Calgary.

The municipal telephone system may be used as a club by Calgary, Alberta, to bring the provincial government to a realization of the fact that that city demands better service at once. J. W. Campbell, vice-president of the Board of Trade, is the leader of the suggestion for a municipal telephone plant.

The Chicago Information and Complaint Switchboard

Arrangements of Illinois Telephone & Telegraph Company to Furnish Information and to Handle Complaints Over the Automatic System—Methods of Doing This Rapidly—Description of the Circuits and Their Operation

By J. M. Cooke*

The information and complaint switchboard as used by the Illinois Telephone & Telegraph Co., in Chicago, presents several features of interest to telephone men. This switchboard is located in the West exchange, Paulina and Monroe streets, and is operated in connection with the long distance switchboard.

The factors governing the design of this switchboard were the centralization of all information and complaint calls from subscribers. This traffic is all handled by operators located at one central point.

Rapid service was accomplished by multipling all trunks before the operators, and terminating the trunks in keys. The line signal lamps were equipped with different colored opals, so the calls could be properly distributed.

The distribution of complaint reports to the different offices is effected by means of the Telautograph. This is, so far as known, the first application of the Telautograph to the distribution of trouble tickets between telephone exchanges. The operator upon receiving a complaint call from the subscriber, writes out the report on the Telautograph transmitter, first cutting in the Telautograph receiver located in front of the filing operators, thus transmitting a writen report to the filing clerk's desk.

This filing clerk located in one of the various exchanges, selects the proper subscriber's card, enters the report on it and passes the card to the tester. The subscriber's cards are arranged to take care of fifty trouble or complaint entries. The tester, after the trouble is cleared, enters his report on the subscriber's card and passes it back to the filing clerk who returns it to the file.

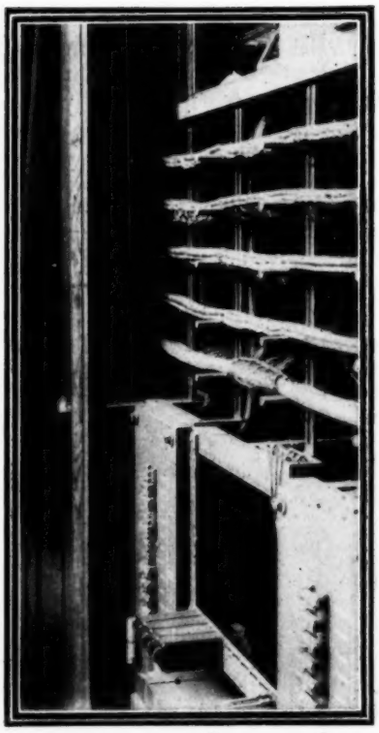
The Information and Complaint Switchboard of the Automatic System of the Illinois Telephone & Telegraph Company in Chicago.

Three separate card files are arranged behind the information and complaint operators. One is arranged alphabetically, one numerically, and one according to streets and numbers. The operators' sets are furnished with cords sufficiently long, so the operators may refer to the files without removing their plugs from the switchboard jacks.

The exterior woodwork of the cabinet is of quarter-sawed oak, with mission finish.

*Mr. Cooke, who died recently, was well known among telephone engineers. At the time of his demise he was head of the manual engineering department of the Automatic Electric Co.

A box panel at the end of the switchboard is of sufficient size to contain the relays associated with the line and trunk circuits. This box panel is provided with removable panel, making the apparatus readily accessible. The key shelves are provided with ample space for writing out tickets. Designation strips are so arranged that the strip can be removed to take care of changes in the grouping of the apparatus.



In the Rear of the Board.

The switchboard is provided with pigeon holes and pockets for the receipt of tickets. It is lighted by lamps placed in a metal hood located in the cap moulding at the top of the board. The keys in the face of the board are mounted on metal plates, each insulated from the plate. Every alternate key is equipped with a red handle. The calling deices are mounted in metal cups on the left of each operator.

Information trunks, terminating keys and associated lamps are used in handling all traffic of subscribers who desire general information. The trunks are equipped with answering and holding keys and signals, so that the operators have complete supervision over the lines. The call lamps are equipped with different colored opals for the purpose of dividing the traffic evenly among operators.

Complaint trunks, terminating "in" keys and lamps on the switchboard and in selector levels in the automatic exchange are reserved for complaint purposes. The supervision is the same as for information trunks.

A complaint call is handled as follows: A subscriber making a complaint, calls a predetermined number and obtaining a complaint operator states his number, for example 81882 and adds that his bell is out of order. The operator presses the proper key in the Telautograph trunk, to cut her Telautograph transmitter in circuit with the Telautograph receiver located in front of the filing clerk on duty in Office No. 8, and then writes out the complaint.

The filing clerk selects the subscriber's card 81882, replacing the card with a blank colored card and enters the complaint, the card being arranged with space for fifty complaints. She also enters the complaint on her daily sheet, and passes the subscriber's card to the tester.

The tester enters the complaint on his daily sheet, and after testing, locating and clearing the trouble completes the record on the daily sheet and passes the card back to the filing clerk to be filed. The filing clerk files the card and removes the blank card from the files and also checks the complaint on her daily sheet.

Dead number trunks terminating in keys and lamps are multiplied before the operators. The dead levels of the selector switches in each office are grouped, wired and cabled to these trunks. All calls on dead levels are received on these trunks.

The subscriber selecting a dead selector level will cause the lamps associated with these trunks to light. An operator will answer and inform the subscriber that the call was not properly made, etc.

Dead number trunks terminating in keys and lamps are multiplied before the operator. All calls are received over these trunks for numbers on which service has been disconnected for any of the following reasons: Cancelled numbers, changed numbers, temporary disconnection. The trunks are divided into the three groups to cover each of these causes for disconnection, and each group is equipped with a different colored opal.

Outgoing trunks terminating in keys and lamps on the switchboard have been provided for use in making calls through the automatic exchange from the information and complaint operators.

Telautograph trunks are multipled in complaint positions and equipped with busy visual signals. These trunks, as already stated, are used for transmitting written complaint reports to the filing clerks located in the various offices. The operator can connect her Telautograph transmitter to one or two receivers, and transmit written reports to two offices simultaneously when desired. The visual busy test is given to all operators whenever a trunk is in use. The operator's telephone sets are equipped with breast plate transmitters and special induction coils to reduce the annoyance to the operator caused by side tones.

Order wire circuits are provided as emergency circuits to replace the Telautograph in case of trouble. Trunks between desks, terminating "in" keys, lamps and visual busy signals are multipled before the operators.

The board is so arranged that at night all calls can be switched so as to appear before but two positions. These two positions are arranged so that one operator may operate them simultaneously.

This equipment was furnished by the Automatic Electric Co. Recently two additional positions have been installed.

New Cable Across Burrard Inlet, British Columbia.

The British Columbia Telephone Co. recently decided to lay a new submarine cable across Burrard Inlet connecting the cities of Vancouver and North Vancouver, says the Electrical News. This new cable will be some three miles in length, will contain 84 circuits, or 168 wires, and will cost about $50,000. The cable, second only in size to that connecting San Francisco and Oakland, and the largest in Canada, has been ordered from a British firm and is expected to arrive in Vancouver about the end of September.

The original intention of the telephone company when it was learned that the present cable had to be removed from the First Narrows, was to lay a small line of 32 wires along the route now authorized by the government. The government refused to sanction this arrangement, however, on account of the objections raised by shipping men, who claimed that the cable would foul the clains of vessels while riding at anchor. A compromise was arranged when the telephone company contracted to lay cable heavy enough to sink into the mud where it would do no damage, and would not be affected by the swift currents of the Inlet.

Jacksonville Home Files Preliminary Bond.

A bond for $10,000 has been filed with the city recorder of Jacksonville, Fla., by the Home Telephone Co., thus complying with the terms of the ordinance recently passed to provide for an election. The bond is given through a surety company, and provides against the failure of the telephone company to carry out its part of the contract with the city of Jacksonville.

Within a few days the active work of preparing for an educational campaign will be begun.

Some Features of Rate Fixing for Electrical Properties*

The Three Objects Designed to Be Accomplished by Rate Fixing—The Investment in a Public Utility Property Ready to Operate—The Value of the Franchise—The Investment of a "Going" Concern—The Matter of Depreciation—The Basis for Rates

By George L. Hoxie

Rate fixing is one of the newer engineering problems. It is true that rate fixing commissions have been, and are, largely composed of lawyers, but the members of all of these commissions have found it necessary to rely largely upon their engineering experts, and it seems to the writer entirely probable, as well as desirable, that the engineering profession should in the future have an increasing share in handling rate fixing matters. It seems probable that for some time to come there will be a steadily increasing number of engineers either employed directly by commissions, or employed by public service corporations in connection with the work of commissions. It is therefore important that engineers should devote some attention to the problems of rate fixing.

Rate fixing is designed to accomplish three objects. First, that the people served by a public utility shall pay the lowest rate possible, consistent with efficient service and a proper return on the investment of the corporation. Second, that each class of consumers pay its proper proportion of the total revenues. Third, that there shall be no discrimination between individual consumers of any given class.

The third problem is not difficult. It is only necessary to pass laws forbidding discrimination and to see that those laws are not evaded. There is no difference of opinion as to the desirability of preventing discrimination, and there is little difference of opinion as to what constitutes discrimination.

The other two problems are difficult. Taking up the first question, it must be determined primarily what is a "proper return," and second, what constitutes "investment." We will consider to begin with the case of a successful public utility. The consumers served by a successful corporation can afford to pay, and should pay, annually a sum of money sufficient to cover:

a. The usual rate of interest on safe investments.

b. An additional sum to compensate for whatever special risk the business of the public may involve; and

c. Such excess profits as are necessary to induce capital to engage in the business.

Item *c*, covering profits necessary to induce capital to engage in the business, is somewhat akin to item *b* and in fact the two items might be combined, yet there are some real differences and it has therefore been thought proper to include the third item, covering inducement. Capital is usually induced to engage in a business by a promoter. Item *c* may therefore be thought of as represented in part by promotion stock, or by the earnings of promotion stock.

What is Investment.

Investment may be in money, or in services. The latter is as real as the former. The fact that services have frequently been grossly overvalued has led to a feeling that the investment of services should not be permitted. This seems wrong. The services of the promoter, for instance, may usually best be paid in stock. This amounts to saying that the services of the promoter may be capitalized. The danger is of course that stock being sometimes simply a matter of the printing press, an excessive payment is made for promotion, and the public is thereafter charged with the necessity of paying dividends upon a large amount of water. Promotion stock in fact is not water unless it be issued to a greater amount than the actual services of the promoter justify.

In appraising a public utility just put together and ready to operate, the writer would include in the appraisal, besides figures representing the cost in place of each physical item (cost of engineering, cost of insurance, etc.), also the exact cost of putting together the corporation (cost of legal work, etc.), and besides these would include payment for the energy and initiative used on the scheme as a whole, under the head of "Cost of Promotion." All the items on the schedule added together would then be the true "Investment" when the entire plant stands ready to begin operation.

Franchise Value.

In most rate fixing investigations the franchise itself is not permitted to be regarded as an investment on which earnings are made. This is not necessarily the case, however, as it frequently costs money to get a franchise, and the terms of the franchise frequently involve an annual expense to the company. For example it is not uncommon for an electric lighting company as a condition of its franchise to engage to supply electricity to various public buildings free of charge, or the company may as a condition of its franchise engage to perform street lighting at an especially low rate. Where any of these elements are found the franchise represents either a real legitimate initial expenditure, or a constant annual expenditure. In either case the franchise may reasonably be regarded as capital on which revenues must be earned. In the latter case the expenditures may with equal justice be charged instead as operating expenses, if for any reason this is preferred as a matter of bookkeeping.

Going Value.

Assuming that we have decided what constitutes "investment" for an enterprise just completed and ready to operate; what is "investment" for "going concern?" It is rather obvious that a completely equipped utility company ready to operate, but having no customers, has a different value from the same utility a little later when we may assume that its total product is being sold at a remunerative figure. The difference in value between a company without customers and the same company under full operation may reasonably be considered as represented by the cost of putting the company into the latter condition; in other words, the cost of establishing the business. This sum is represented by early losses, or by the failure to earn proper profits, in the early years of operation.

Depreciation.

There is a wide difference of opinion as to proper methods of figuring depreciation and even as to what constitutes depreciation. It will therefore be assumed that depreciation is figured on a straight line basis, using the assumed useful life of the various items making up the total investment as a basis for determining the yearly charge against each item to cover depreciation. It is also assumed that depreciation has only one value at a given moment for a given item.

The items of cost of franchise if any, and the costs of general engineering, superintendence, insurance, law, promotion, going value, etc., should be subject to a depreciation charge as well as the items covering actual physical property. This means, of course, that such intangible costs as those just

* Abstract of paper presented to Engineers' and Architects' Association of Southern California.

enumerated are to be written off, or amortized, in the course of time.

The bookkeeping in connection with depreciation expenditures should be wholly under the control of the commission, that it may be made certain that no part of the plant, built with depreciation money, is capitalized, even though the depreciation fund proves in the course of several years, to have been larger than was really necessary. This, of course, applies to additions made under regulation and not to additions made out of surplus earnings before the advent of rate regulation.

If after determining a proper income to be allowed, it be found for a particular corporation that its stock and bonds have enjoyed a wide market, and have been generally distributed and would be considerably depreciated by the revenue proposed to be allowed, then it seems to the writer that a commission may reasonably allow weight to such a state of facts. On the one hand a strict ruling will bring an immediate loss upon the investor, and on the other hand if the strict ruling be not followed, a loss is thrown upon the general public, by collecting from them higher rates than are necessary. A newly organized commission might very reasonably compromise by fixing a term of years at the end of which strict rulings will generally apply, and in the meantime gradually lower the rates during said term. Such a course does not correct past injustice, but it divides the losses resulting from injustice between the stockholder who has made an unfortunate investment, and the public that permitted the unfortunate conditions to exist.

Detail of Rates.

In the writer's opinion the revenue collected should be based ultimately upon the "present value" (reproduction cost, less straight line depreciation) of all physical and non-physical items of property necessary to the service sold. The revenue should be sufficient to cover operating expenses; depreciation charges; and income upon "present value."

It would seem at first sight that if an agreement be once reached on total revenue to be collected the rate problem would be practically solved. Such is by no means the case. It is hardly too much to say that some of the hardest problems still remain. These problems do not seem to be of such a nature that any general solution may be indicated, but they are well worth discussion.

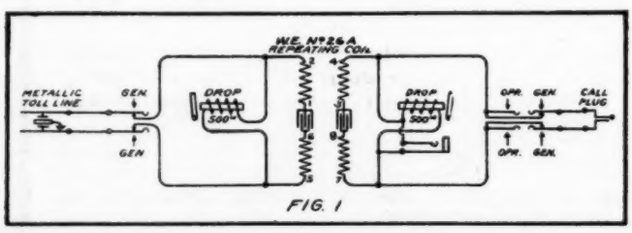
Queries on Theory and Practice

Connections for a Grounded Phantom.

I have had considerable trouble in getting my operators on a magneto board to use the repeating coil circuits when connecting up metallic toll line with ungrounded farm lines. I first thought of installing a No. 37 W. E. repeating coil permanently in each toll line running into the board, but the manager decided that such coil would be too expensive. A cheaper ring-through coil was purchased, but after installing it, we found that we could ring through only with a heavy hand generator.

The accompanying drawing, Fig. 1, shows how the line circuits were finally arranged, which have worked nicely. I have need of another line running to a neighboring town and as we have one of these metallic lines equipped with a coil at each end running into this board, I thought it might be possible to take a grounded phantom line from this circuit. This would be possible were it not for the condenser at No. 1 and No. 6, which I can not do away with on account of interfering with the ringing on the metallic line. If you can figure out the solution let me have it.

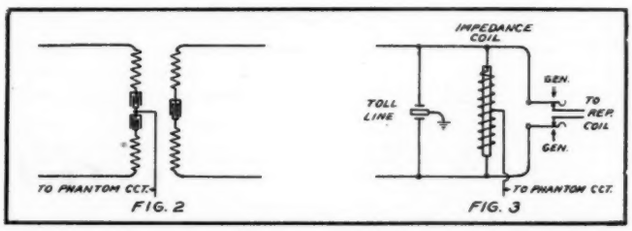
You might try putting two condensers in series at the middle of the repeating coil at 1 and 6 and tapping your phantom between the condensers as shown in Fig. 2. It will be necessary to select the condensers carefully so as to get two which have very nearly the same capacity, so as not to unbalance the line. Of course, you will have to test your repeating coil itself alone to assure yourself that its windings are balanced enough to allow it to be used



Repeating Coil Line Circuit.

for phantom work. If not, you will be obliged to buy a better coil.

We wish to call your attention to the fact that the phantom circuit will be opened every time an operator rings on the physical line, because you have the ringing key inserted between the coil and the line. This trouble may be obviated by bridging a good impedance coil across the line beyond the ringing key, Fig. 3, and taking the phantom line from the center tap of the impedance coil. There will be



Phantom Circuits Tapped Through Condensers and Impedance.

some loss in ringing and of talking current on the physical circuit, due to this bridged impedance, but you may not notice it very much.

Connection of Coils to Negative Side of Battery.

Why do the makers of switchboards tie all coils to the negative or ungrounded terminal of battery? That is, almost all of them. It seems to me that there are many places in telephone circuits where leaving some of them attached to ground would make the circuits better or more simple.

It is true that circuit designers would often like to have coils of relays or magnets attached to ground or positive battery, but the trouble from electrolysis has been the deterring factor. When a coil winding is left attached to ground, there is a small but certain leakage from it to the frame or core and from thence through other coils to the negative battery terminal.

Wherever the current *leaves* the coil, it eats off some of the copper of the wire, and in time the wires will become greatly corroded. This trouble is worse with the higher voltages now used on telephone switchboards. However, it is possible by careful insulation to reduce the leakage to such a low value that the coils will last for many years. Those coils which are left attached to the negative terminal of battery suffer no corrosion, because where the current *enters* a metal, no electrolysis occurs.

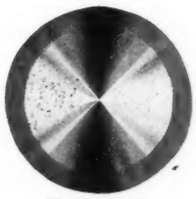
There goes the Lord's nickel.

OUR SUCCESS is due to our policy of thinking of the interests of our customers as well as our own—unlike little Willie on his way to Sunday School.

His mother had given him two nickels one "for the Lord" and one to buy candy.

As he walked over a cellar grating, one of the nickels dropped from his hand, disappearing from sight. Said Willie: "Too bad, there goes the Lord's nickel."

We want *our* nickel, but we want *you* to get *yours* too, and that's why we are selling the insulation on our No. 17 Copper Clad Twisted Pair *at cost.* Our nickel comes with a reasonable profit on the conductor.



Trade-Mark
"Weld Clad"

It will pay you to get our prices before ordering drop-wire.

DUPLEX METALS COMPANY

CHICAGO OFFICE
853 Peoples Gas Building

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800 to 2,000 blows per minute

Drills 10 Times Faster Than by Hand!

Phillips' Spring Hammer

For Drilling Holes in Stone, Concrete, Brick, Tile, Conduit, Etc.

Absolutely indispensable for telephone men, electrical workers and mechanics. Eliminates the strain and drudgery of drilling by hand and does the work in one minute that ordinarily requires ten times as long by manual methods.

Strikes 800 to 2,000 powerful hammer blows per minute. All you do is turn the crank. This spring does the work. Makes round and straight hole ⅜ inch to 1½ inches in diameter. Perfectly true to size. Made with extensions for ceiling and floor drilling. Strong and simple in construction. Nothing to get out of order. Compact, easily transported.

Sold at a price that will enable every telephone man, electrical worker and mechanic to have one in his kit. Write for Bulletin T and Price List.

ORR & LOCKETT HARDWARE Co
Established 1872

16-20 W. Randolph St.
CHICAGO, ILL.

Practical Subjects—Letters and Discussions

A Simple and Easily Learned Ringing Code.

Mention was made in a recent issue of TELEPHONY of the ringing code used by the Monmouth Telephone Co. of Monmouth, Illinois. The code probably originated with Manager F. C. Woods, of Galesburg, Illinois, and is very simple.

In it figure 1 represents one short ring, 2 two short, 3 three short, 4 four short, and 5 one long ring. By a combination of these figures at least twenty good rings can be obtained without running up too high.

The code as used at present is as follows:

1 -	25 - - —	151 - — -	255 - - — —
2 - -	35 - - - —	152 - — - -	515 — - —
3 - - -	51 — -	153 - — - - -	525 — - - —
4 - - - -	52 — - -	155 - — —	551 — — -
5 —	53 — - - -	251 - - — -	552 — — - -
15 - —	55 — —	252 - - — - -	555 — — —

Mr. McQuiston, manager of the Monmouth company, says that the great advantage of this code over all others is that the number itself bears a fixed relation to the ring. A new operator or a subscriber can learn the complete code in five minutes so that they can ring any subscriber on the line if they have the subscriber's number.

The code is giving good satisfaction where it is in use and both subscribers and telephone company consider it the best code yet developed.

Some Hints on Telephone Directories.

In one of the weekly bulletins of the Federal Telephone & Telegraph Co. of Buffalo, N. Y., some pointers are given regarding making up the teelphone directory.

Three very essential points to observe in making a telephone subscribers' directory what it should be, are:

1st—Accuracy of subscribers' numbers, names and addresses.

2nd—Ease of finding subscribers' numbers and names.

3rd—Clearness and neatness in printing.

Accuracy of numbers and names depends absolutely upon having the original list correct and the careful reading and correcting of the printer's proof.

The subscriber's number and name can be more easily found in the book by having:

(*a*) The *pages* in the book *numbered* with a prominent figure on the upper left and right hand corner.

(*b*) Where two or more exchange lists appear in the same directory, the names of the towns (arranged alphabetically) should be printed on the front cover and, after the name, should be printed the page number on which the corresponding subscribers' lists appear, as an example:

Angelica Exchange
including

	Page		Page
Angelica, N. Y.	1	Bolivar, N. Y.	14
Andover, N. Y.	6	Shinglehouse, Pa.	16
Belfast, N. Y.	11	Wellsville, N. Y.	18

(*c*) The subscribers' names should not only be arranged alphabetically as to surname but as to initials or given names; that is, Smith, A. B., should come before Smith, J. A.

The telephone numbers should always be in black faced type.

Always have the street and number address of the exchange and office appear under the name of the company on both the cover and at the beginning of each subscriber's list,—as

Hornell Exchange, C. M. Kelley, Manager.
18 Broad Street.

No concern is so large or well advertised that everybody knows its street and number address. You want the public to know where you are and make it easy for it to find your place of business.

Do not let any one of these points get by you in getting out your next book.

A Strange Case.

We had a circuit which would go bad every evening at dusk and would come up all right the next morning at daybreak, says a writer in the Cumberland Telephone Journal. We were puzzled as to what the trouble was and being unable to find it in the regular way, decided to send a man to the line and have him there when dusk came. He found a lot of pesky little English sparrows roosting on the top wire of the drop, crossing the circuit between two buildings. When he got the birds off the trouble was cleared.

An Application of the Varley Loop Test.

I was recently sent out to locate a trouble in a 100-pair cable and, as I feel that I learned something from the experience, it may be interesting to recount it.

The cable is about 200 feet long and carries the line from a cable house, where a submarine terminates, under the floor of a bridge to the terminal pole box. It is thoroughly protected by a wooden box under the bridge and by iron pipe at the pole.

The trouble was an aggravating one as a pair of wires would show clear, when the wire chief made the ordinary relay test preliminary to putting up a Morse circuit on it and then as the wire was operated it gradually became "heavy."

A voltmeter test would then show a leak to ground of from 15 to 50 volts out of 96 volts. Although there were plenty of spares in the cable, it was very bothersome to be obliged to repeatedly send a lineman to the box to make the change. Hence it was decided that the trouble must be located.

I understood the general principles of locating cable trouble, but had had no actual experience and so had to depend upon what the wire chief could tell me in a few minutes before I left the office. I had a portable Wheatstone bridge and he advised using a combination of a straight loop measurement and a Varley. He gave me the formula:

$$D = 200\frac{R_l - R_v}{R_l}$$

in which D equals the distance from the end of the cable where the bridge is connected to the point in trouble (*a* in Fig. 2);

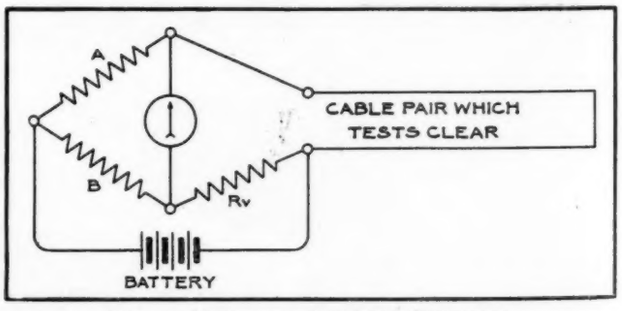
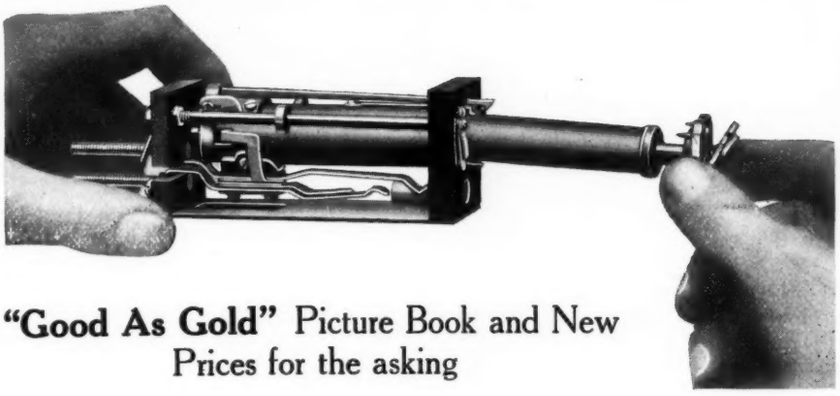


Fig. 1 Measurement of Loop Resistance.

R_l equals the resistance of the loop formed by crossing a good pair of wires at one end (Fig. 1); R_v is the resistance given by the Varley; and the 200 is the length of the cable in feet.

I made about six measurements on different pairs from each

"SWEDISH-AMERICAN" is the answer to your question of QUALITY



"Good As Gold" Picture Book and New Prices for the asking

The only Magneto Switchboard having **Self-contained** Drop and Jack with removable coil from the **front.**

In future
CANADA TRADE
will be supplied
direct from **Chicago**

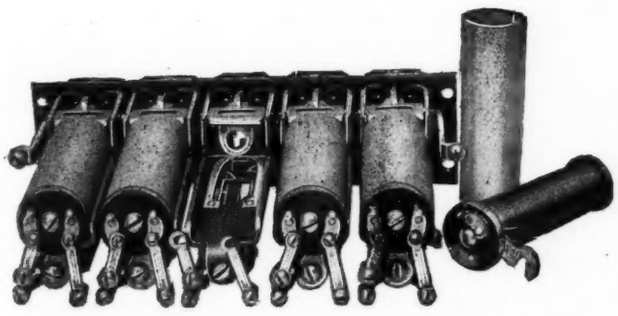
The SWEDISH-AMERICAN TELEPHONE CO. is no longer associated with the DOMINION TELEPHONE MFG. CO.

"Hercules" Telephones have stood the test of time.
Don't be fooled or misled by offers of second-hand Drops.
Deal **direct** with **headquarters** and get the latest **improved** kind.

SWEDISH-AMERICAN TELEPHONE MFG. CO.

5235 E. Ravenswood Park, CHICAGO, ILL.

A Cracraft-Leich Switchboard will give as good service after 10 years as when first installed.



You can interchange the drop spools and replace burnt out coils without changing your armature air gap one particle. This means a fixed armature pole piece, which is to be found only in the Cracraft-Leich drop. Nor do you have to disturb the wiring.

The jack ferrule can be removed from the front of the board and when slightly worn can be replaced at a nominal cost.

There are many other reasons why you should install a Cracraft-Leich Switchboard in preference to all others. Let us tell you by mail what we have to offer for a complete exchange equipment.

Send your orders direct to the

CRACRAFT, LEICH ELECTRIC CO.

Manufacturers of Cracraft-Leich and North Electric Manual Equipment

GENOA, ILLINOIS

end of the cable. One set gave 100 feet and the other gave 25 feet from the cable house end. On the strength of these results (and our hands and knees), the two linemen and I crawled under the bridge, ripped off the box covering and inspected the cable closely but found nothing that would be likely to cause the trouble. Then one of the linemen spoke up. He did not believe the trouble was under the bridge at all, but the pothead under the cable box looked bad to him and he would bet the trouble was there.

Well, the next day they opened the cable at a sleeve below the pothead. They picked out the bad wires, opened and tested them both ways. And all the trouble showed toward the pothead! So my measurement was only about 100 feet out of the way. Naturally I was not much elated at the result of my first attempt and the remarks of the fellows at the office did not console me any.

The next day I thought I would practice a little on a length of wire at the office. The results of my test are most easily shown by tabulating them:

Wire used = 204 feet of 22 gage twisted pair.

D, by measuring with tape, = 128 feet. R_l = 4.42 ohms and R_v, 3.03 ohms.

Substituting in the formula $D = 204 \frac{4.42-3.03}{4.42} = 64.1$ feet.

Now I had carefully checked the measurements so I concluded that the formula must be incorrect. The wire chief had given me a rapid-fire proof by saying that, as the resistance of the length a in Fig. 2 was common to both the right hand arms of the bridge, they (the two a's) must cancel each other and hence $R_v = 2\ R_b$ whence the formula.

A little study will show, however, that this is true only when the ratio $\frac{A}{B} = 1$. Of course, in measuring the 19 gage cable and the wire, I had used $\frac{A}{B} = \frac{10}{100}$. The wire chief in measuring line troubles deals with high resistances and so the formula had always given satisfactory results.

The development of an equation to use when the ratio $\frac{A}{B} = \frac{1}{100}$ is as follows: R_v now represents the total resistance in the variable arm.

$$\frac{R_v + R_a}{R_a + 2R_b} = \frac{B}{A} = \frac{1000}{10} = 100 \text{ or}$$

$$\frac{R_v + R_a}{100} = R_a + 2\ R_b \qquad (1)$$

But $2\ (R_a + R_b) = R_l$, therefore $2\ R_b = R_l - 2\ R_a$.

Substituting in (1), $\frac{R_v + R_a}{100} = R_a - R_l - 2\ R_a = R_l - R_a$,

which is the same as $0.01\ R_v = R_l - 1.01\ R_a$ or

$$R_a = \frac{R_l - 0.01\ R_v}{1.01}$$

Let U equal the length of wire having unit resistance:

Then $U = 2 \frac{\text{length of cable}}{R_l}$, therefore

D or the length of $a = R_a\ U$

$$D = \frac{R_l - 0.01\ R_v}{1.01} U.$$

The twisted pair used was 204 feet long, with a loop resistance of 4.42 ohms, therefore $U = \frac{2 \times 204}{4.42} = 92.30$ feet per ohm.

Substituting in the equation given above and solving

$$D = \frac{4.42 - 3.03}{1.01} \times 92.3 = 127.02 \text{ feet.}$$

This is a very close result but the conditions of the test were of course ideal. I see no reason, however, why accurate results may not be secured in practice if the average is taken of a number of careful measurements. The resistance of the ground makes no difference as it is common to both arms. If one is uncertain as to the length of the cable, it may be obtained from the loop measurement by referring to tables

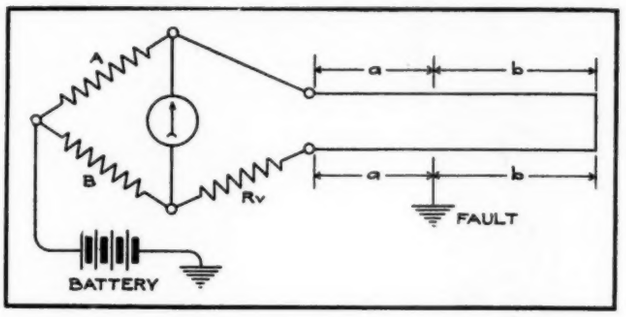


Fig. 2.—Varley Loop Test.

which show the lengths of wire having unit resistance at various temperature.

It is necessary to take the temperature into account as the length having unit resistance varies considerably in the ordinary temperature range. If the ratio of $\frac{A}{B} = \frac{1}{10}$, a proof similar to the above, will give the formula, $D = \frac{R_l - 0.1\ R_v}{1.1} U.$

The general formula is therefore seen to be

$$D = \frac{R_l - \frac{A}{B} R_v}{1 + \frac{A}{B}} U.$$

Cambridge, Mass. Percy F. Goodrum.

A Practical Directory from North Carolina.

The North State Telephone Co., of High Point, N. C., J. F. Hayden, manager, has sent TELEPHONY a copy of its latest directory, which impresses us as comprising many good points. It is substantially bound in heavy manilla covers, printed in red and blue to permit reducing in colors the Independent shield.

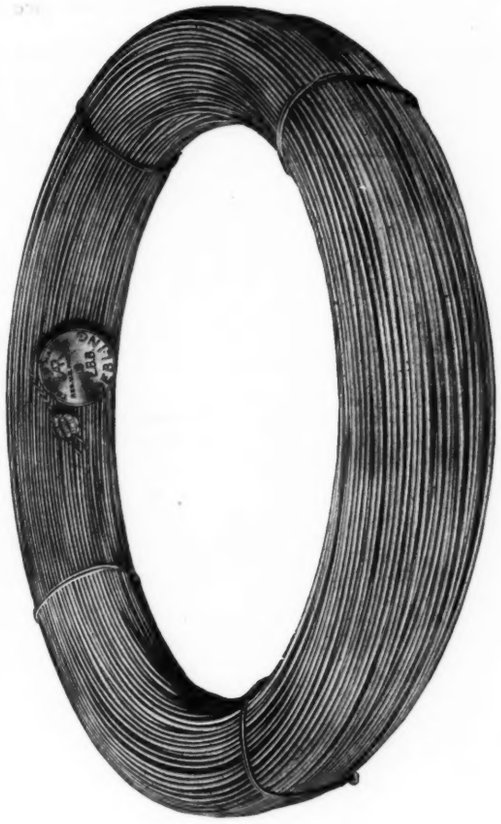
The inside front cover shows the well known cartoon by TELEPHONY's cartoonist, Brandenburg (drawn for the Kellogg Switchboard & Supply Co., of Chicago, and copyrighted by that corporation), picturing the nuisance and annoyance of the habit of borrowing a neighbor's telephone —a striking object lesson for the non-subscriber. On the first page appear the instructions to subscribers, which are brief and explicit.

The second page shows a map of the toll and long distance connections of the company, enabling the subscriber to see at a glance that the town he wishes to reach is connected, and which offers also a memorable bid for long distance business by reason of the wide scope shown. On the opposite page are the rates for such service. These are tabulated in such a manner that no difficulty is experienced in ascertaining the cost of a toll message.

The body of the directory is printed on good paper in clear, readable type, the names being divided between the four exchanges affiliated under the management of Mr. Hayden, High Point, Thomasville, Lexington and Southmount. The whole forms a good, common sense reference book, readily consulted, simple and capable of long wear.

Illinois Company Stringing Cable.

The Milledgeville (Ill.) Mutual Telephone Co. is replacing some of its open wires with cable.



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of the manufacture of **Roebling Double Galvanized Telephone Wire** is conducted with one end in view —to produce durable, uniform wire of high conductivity.

The metals used are carefully selected, subjected to exacting tests to prove their quality, and **protected** against rust by real galvanizing.

John A. Roebling's Sons Co.

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We make also Hard Drawn Copper and Copper Clad Steel Wire, Wire Strand and Telephone Cables.

Sterling **Quality**

Our Motto: Quality First—Prices Right

Distributing Frames
Can Top Terminals
Arresters and Protectors

Write for Bulletin No. 3 and Price List

Lafayette Electric & Manufacturing Co.
Lafayette, Indiana

Quality **Sterling**

American Telephony from an Englishman's Viewpoint

Average European Stands Aghast at Marvellous Precision and Comprehensiveness of Our Telephone Service, Which Has Attained a Perfection Entirely Unknown Abroad—Whimsical Moralizing on Operation of a Big Exchange

By Arnold Bennett

[EDITOR'S NOTE.—Arnold Bennett is an English author whose books are widely known and read in the United States. Among them are "Clayhanger," "The Old Wives' Tale," "How to Live on Twenty-Four Hours a Day," etc. He recently completed a trip to this country, under contract with Harper & Brothers, of New York City, and his impressions of America are now appearing in Harper's magazine. The following is an extract from an article which appeared in the July issue of that periodical, and which is reprinted here through the courtesy of the publishers. The articles are copyrighted by Harper & Brothers.]

What strikes and frightens the backward European almost as much as anything in the United States is the efficiency and fearful universality of the telephone. Just as I think of the big cities as agglomerations pierced everywhere by elevator-shafts full of movement, so I think of them as being threaded, under pavements and over roofs and between floors and ceilings and between walls, by millions upon millions of live filaments that unite all the privacies of the organism—and destroy them in order to make one immense publicity. I do not mean that Europe has failed to adopt the telephone, nor that in Europe there are no hotels with the dreadful curse of an active telephone in every room. But I do mean that the European telephone is a toy, and a somewhat clumsy one, compared with the inexorable seriousness of the American telephone. Many otherwise highly civilized Europeans are as timid in addressing a telephone as they would be in addressing a royal sovereign. The average European middle-class householder still speaks of his telephone, if he has one, in the same falsely-casual tone as the corresponding American is liable to speak of his motor-car. It is naught—a negligible trifle—but somehow it comes into the conversation!

He Commits an Act That Shakes the Firmament.

"How odd!" you exclaim. And you are right. It is we Europeans who are wrong, through no particular fault of our own. The American is ruthlessly logical about the telephone. The only occasion on which I was in really serious danger of being taken for a madman in the United States was when, in a Chicago hotel, I permanently removed the receiver from the telephone in a room designed (doubtless ironically) for slumber. The whole hotel was appalled. Half Chicago shuddered. In response to the prayer of a deputation from the management I restored the receiver. On the horrified face of the deputation I could read the unspoken query: "Is it conceivable that you have been in this country a month without understanding that the United States is primarily nothing but a vast congeries of telephone-cabins?" Yes, I yielded and admired! Aud I surmise that on my next visit I shall find a telephone on every table of every restaurant that respects itself.

It is the efficiency of the telephone that makes it irresistible to a great people whose passion is to "get results"—the instancy with which the communication is given, and the clear loudness of the telephone's voice in reply to yours: phenomena utterly unknown in Europe.

Were I to inhabit the United States, I too should become a victim of the telephone habit, as it is practiced in its most advanced form in those suburban communities to which I have already incidentally referred. There a woman takes to the telephone as women in more decadent lands take to morphia. You can see her at morn at her bedroom window, pouring confidences into her telephone, thus combining the joy of an innocent vice with the healthy freshness of breeze and sunshine. It has happened to me to sit in a drawing-room, where people gathered round the telephone as Europeans gather round a fire, and to hear immediately after the ejaculation of a number into the telephone, a sharp ring from outside through the open window, and then to hear in answer to the question, "What are you going to wear tonight?" two absolutely simultaneous replies, one loudly from the telephone across the room, and the other faintlier from a charming human voice across the garden: "I don't know. What are you?" Such may be the pleasing secondary scientific effect of telephoning to the lady next door on a warm afternoon.

He Inspects the God in the Machine.

Now it was obvious that behind the apparently simple exterior aspects of any telephone system there must be an intricate and marvelous secret organization. In Europe my curiosity would probably never have been excited by the thought of that organization—at home one accepts everything as of course!—but, in the United States, partly because the telephone is so much more wonderful and terrible there, and partly because in a foreign land one is apt to have strange caprices, I allowed myself to become the prey of a desire to see the arcanum concealed at the other end of all the wires; and thus, one day, under the high protection of a demigod of the electrical world, I paid a visit to a telephone exchange in New York, and saw therein what nine hundred and ninety-nine out of every thousand of the most ardent telephone users seldom think about and will never see.

A murmuring sound, as of an infinity of scholars in a prim school conning their lessons, and a long row of young women seated in a dim radiance on a long row of precisely similar stools, before a long apparatus of holes and pegs and pieces of elastic cord, all extremely intent; that was the first broad impression.

The Switchboard Is to Him an Arabian Night's Wonder.

One saw at once that none of these young women had a single moment to spare; they were all involved in the tremendous machine, part of it, keeping pace with it and in it, and not daring to take their eyes off it for an instant, lest they should sin against it. What they were droning about was impossible to guess; for if one stationed oneself close to any particular rapt young woman, she seemed to utter no sound, but simply and without ceasing to peg and unpeg holes at random among the thousands of holes before her, apparently in obedience to the signaling of faint, tiny lights that in thousands continually expired and were rekindled. It was so that these tiny lights should be distinguishable that the illumination of the secret and finely appointed chamber was kept dim.

Throughout the whole length of the apparatus the colored elastic cords to which the pegs were attached kept crossing one another in fantastic patterns.

We who had entered were ignored. We might have been ghosts, invisible and inaudible. Even the supervisors,

Patent Pend.ng

"Hy-Po-Stat"

The All Metal and Porcelain Cable Protection
This is the terminal that

"Protects Your Cables"

and makes your investment a permanent one.
For further information ask your jobber, or write

The Royal Electric Company
SIDNEY, OHIO

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We Guarantee
Greatest Efficiency
Longest Life
Most Satisfactory Service
Lowest Cost of Up-keep
In the Use of our wire.

Write for FREE SAMPLE
Make Test and Comparison

Approved by Leading Institutions of Technology and Telephonic Science. Handled by most representative Jobbers and Supply Houses.

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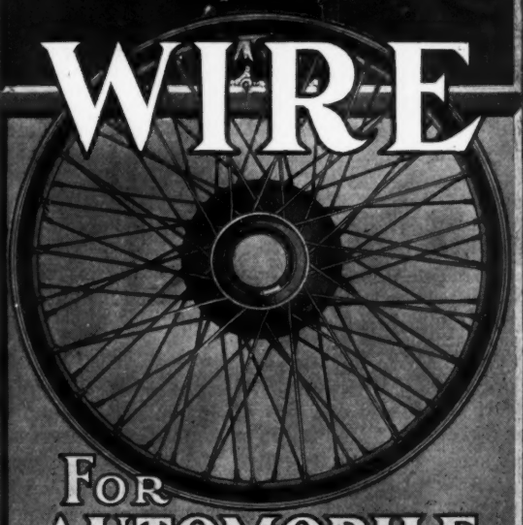
AMERICAN STEEL & WIRE CO'S

WIRE



FOR AUTOMOBILE WHEELS

WIRE WHEELS mean nearly 70% more tire mileage over wooden wheels because the bare rims and wire spokes radiate the heat; and further, they softly float over obstructions while wooden wheels rigidly bounce. Wire wheels are much stronger by actual test, and are also considerably lighter, especially at the rim and this materially economizes engine power. Eighty per cent of recent Grand Prix racing cars were equipped with wire wheels; and this is about the percentage of wire wheels used on all pleasure cars in Europe. They are destined to become universal as their beauty, economy and engineering advantages make them the only correct wheel for automobile use. You should insist upon having them on your car. Write for our *American Wire Wheel News*, fully describing all makes and methods of manufacture, and how you can adapt them to your car.

Frank Baackes, V. P. and G. S. A.
72 West Adams Street Chicago

less-young women set in authority, did not turn to glance at us as they moved restlessly peering behind the stools.

And yet somehow I could hear the delicate shoulders of all the young women saying, without speech: "Here come these tyrants and taskmasters again, who have invented this exercise which nearly but not quite cracks our little brains for us! They know exactly how much they can get out of us, and they get it. They are cleverer than us and more powerful than us; and we have to submit to their discipline. But—"

And afar off I could hear: "What are you going to wear tonight?" "Will you dine with me tonight?" "I want two seats." "Very well, thanks, and how is Mrs. . . . .?" "When can I see you tomorrow?" "I'll take your offer for those bonds." . . . . . And I could see the interiors of innumerable offices and drawing-rooms. . . . . But of course I could hear and see nothing really except the intent drone and quick gestering of those completely absorbed young creatures in the dim radiance, on stools precisely similar.

He Finds Things Diabolically Ingenious.

I understood why the telephone service was so efficient. I understood not merely from the demeanor of the long row of young women, but from everything else I had seen in the exact and diabolically ingenious ordering of the whole establishment.

We were silent for a time, as though we had entered a church. We were, perhaps unconsciously, abashed by the intensity of the absorption of these neat young women. After a while one of the guides, one of the inscrutable beings who had helped to invent and construct the astounding organism, began in a low voice on the forlorn hope of making me comprehend the mechanism of a telephone-call and its response. And I began on the forlorn hope of persuading him by intelligent acting that I did comprehend. We each made a little progress.

I could not tell him that, though I genuinely and humbly admired his particular variety of genius, what interested me in the affair was not the mechanics, but the human equation. As a professional reader of faces, I glanced as well as I could sideways at those bent girls' faces to see if they were happy. An absurd inquiry! Do I look happy when I'm at work, I wonder! Did they then look reasonably content? Well, I came to the conclusion that they looked like most other faces—neither one thing nor the other. Still, in a great establishment, I would sooner search for sociological information in the faces of the employed than in the managerial rules.

He Probes the Wage Scale.

"What do they earn?" I asked, when we emerged from the ten-atmosphere pressure of that intense absorption. (Of course I knew that no young woman could possibly for any length of time be as intensely absorbed as these appeared to be. But the illusion was there, and it was effective?)

I learned that even the lowest beginner earned five dollars a week. It was just the sum I was paying for a pair of clean sheets every night at a grand hotel. And that the salary rose to six, seven, eight, eleven, and even fourteen dollars for supervisors, who, however, had to stand on their feet seven and a half hours a day as shopgirls do for ten hours a day; and that in general the girls had thirty minutes for lunch, and a day off every week, and that the Company supplied them gratuitously with tea, coffee, sugar, couches, newspapers, arm-chairs and fresh air, of which last fifty fresh cubic feet were pumped in for every operator every minute.

"Naturally," I was told, "the discipline is strict. There are test wires . . . . We can check the 'time elements' . . . . We keep a record of every call. They'll take a dollar a week less in an outside place—for instance a hotel. . . . . Their average stay here is thirty months."

And I was told the number of exchanges there were in New York, exactly like the one I was seeing.

A dollar a week less in a hotel! How feminine! And how masculine! And how wise for one sort of young woman and how foolish for another! Imagine quitting that convent with its guaranteed fresh air, and its couches and sugar and so on, for the rough hazards and promiscuities of a hotel! On the other hand, imagine not quitting it!

Said the demigod of the electrical world, condescendingly: "All this telephone business is done on a mere few hundred horsepower. Come away, and I'll show you electricity in bulk."

And I went away with him, thoughtful. In spite of the inhuman perfection of its functioning, that exchange was a very human place indeed. It brilliantly solved some problems; it raised others. Excessively difficult to find any fault whatever in it.

A marvelous service, achieved under strictly hygienic conditions—and young women must make their way through the world. And yet—Yes, a very human place indeed!

Western Bell Ready to Be Wound Up.

All but the few last final steps have been taken in liquidation of the Western Telephone & Telegraph Co., says the Boston News Bureau, in a recent dispatch. A stockholders' special meeting was held a few days ago at which it was unanimously voted to dissolve the company and the proper officials were authorized to petition the secretary of state of New Jersey to grant the proper legal documents permitting dissolution.

This step is the logical sequence of acquisition by American Telephone of 99½ per cent. of the $32,000,000 preferred and common stocks of this company as a result of its offer of October, 1911, to minority shareholders. That offer consisted in giving the privilege of exchanging four shares of Western Telephone preferred for three shares of American Telephone and receiving $20 in cash besides. To the common shareholders one share of American Telephone was offered for each five shares then held. This figured out a price of $28 per share of Western common.

Disappearance of Western Telephone eliminates a needless piece of duplication in the Bell system. The anomaly of its existence was that it presented the sole illustration of a holding company within a holding company. As a result of its liquidation, therefore, American Telephone will own directly the four operating companies, Wisconsin Telephone Co., Cleveland Telephone Co., Southwestern Telephone Co. and Northwestern Telephone Exchange Co.

So far as actual administration is concerned these four operating companies will come within three of the eight great operating units into which American Telephone has divided the country.

Wisconsin and Northwestern will be operated by the same management which is administering Michigan Telephone. Cleveland will come under the Chicago Telephone-Central Union group, while the Southwestern falls under the control of the great middle western administrative divison.

The $9,958,000 bonds will remain undisturbed. They are to be assumed by American Telephone. At maturity in 1932 they will naturally be refunded into American Telephone securities, but that is a long way off. In the meantime the collateral by which they are secured must of course remain intact.

It Pays to Protect Your CABLE

Lead cable sheath not only is expensive but very easily damaged unless properly safeguarded.
It is especially liable to injury where it passes through trees or over railroads and it is in such cases that the absolute, inexpensive protection afforded by Aerial Conduit more than pays for itself each year.
Write today for booklet describing the way in which Aerial Conduit prevents deterioration of cable sheath.

Aerial Conduit Co.
Nelson G. Hunter, Pres.
Wabash, - - - Indiana

Underground
CONDUIT SYSTEMS
our specialty

WORK STARTED
AT ANY POINT
WITHIN 48 HOURS

Write us for estimate

G. M. GEST
Engineer—Contractor
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277 Broadway, New York
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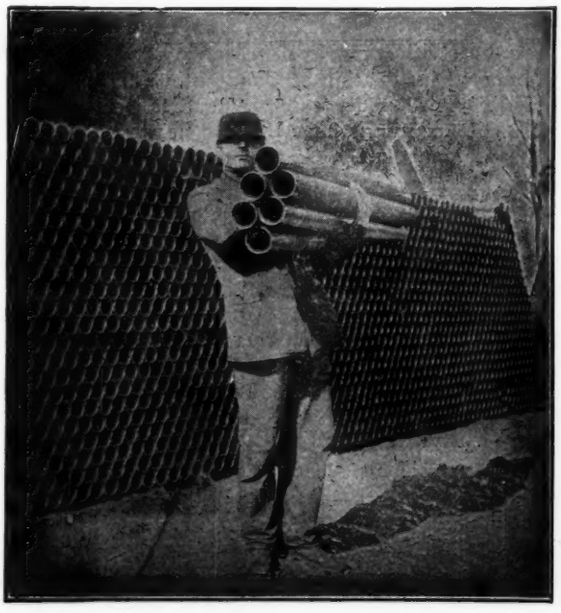
Chicago **Montreal**



Carrying 30 feet 3-inch socket joint conduit.

Orangeburg Fibre Conduit
("Admitted to be the best Fibre Conduit")

Made in FOUR STYLES OF JOINTS
Socket, Sleeve, Screw and Harrington
WITH BENDS AND FITTINGS FOR SAME

Is the lightest conduit made

and means low freight and cartage costs

Send for The Conduit Book

THE FIBRE CONDUIT COMPANY

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MAIN OFFICE AND FACTORY
Orangeburg, New York
McClary-Jemison Machinery Co., Birmingham, Ala.
Tri-Provincial Electrical Supply Co., Winnepeg, Can.

Pierson, Roeding & Co.,
San Francisco, Cal.
Los Angeles, Cal.
Seattle, Wash.
Salt Lake City, Utah.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

From Factory and Salesroom

Automatic Equipment for Regina, Canada.

The Automatic Electric Co., of Chicago, is just in receipt of an order for automatic telephone equipment to be installed in the exchange at Regina, Saskatchewan, Canada. This exchange is operated under the provincial government of Saskatchewan, and is the second automatic installation to be made for that government, the first installation having been made at Saskatoon the early part of the current year, with 1,500 lines installed.

The specifications for the Regina exchange provide for an immediate installation of 3,000 lines of automatic central office equipment, the power plant having an ultimate capacity of 6,000 lines. There is also to be installed with the equipment a four position information and complaint desk, a two position wire chief's and test switchboard, and a sixteen position toll and rural switchboard, together with a one position chief operator's switchboard, all of which is to be furnished by the Automatic Electric Co.

The telephone exchange at Regina was practically destroyed by the tornado which struck that city June 30. The Automatic Electric Co. has been negotiating for the installation of its equipment in Regina since that time. It offered to make shipment of the apparatus twenty-four hours after receiving the order and to have the central office equipment installed ready for service, within fourteen days after the arrival of the apparatus in Regina. This, however, was not required as the government had made other provisions for temporary relief, so that the automatic equipment can be manufactured and erected in accordance with detailed specifications to be prepared to meet all the special requirements of the Regina exchange.

Annual Meeting of Electrical Credit Men.

The annual meeting of the National Electrical Credit Association which was held at Cleveland, Ohio, the latter part of June was the most profitable and enjoyable one. The reports presented showed increased activities on the part of members and correspondingly greater benefits. As a result of nearly 500 representative jobbers and manufacturers co-operating in the exchange of ledger experiences for the guidance of fellow members, substantial benefits have been derived.

A Group of Electrical Credit Association Delegates.

The photograph, reproduced through the courtesy of Frank B. Cook shows the faces of many men who are well known in the telephone manufacturing and supply field.

The officers of the association for the ensuing year are: George J. Murphy, of the Pettingell-Andrews Co., Boston, president; vice-president, John H. Dale, the Dale Co., New York; secretary-treasurer, Frederic P. Vose, Chicago.

This is the thirteenth consecutive reappointment for Mr. Vose as he has served as general secretary since the organization in 1898.

A New Record in Cut-Overs.

The Conneaut Telephone Co., of Conneaut, Ohio, a flourishing city about sixty-five miles east of Cleveland, on the main lines of the L. S. & M. S. and Nickel Plate Railways, was one of the early Independent plants built by Barber & Brailey, in 1897. It was subsequently taken over by a coterie of local citizens and for the past ten years has been under the exceptionally capable management of M. Goebricher. He has proved his ability by the building up of this plant from about 600 subscribers at the time of assuming the management, to a present of over 2,500.

Originally the plant was a magneto system, like practically all of its day, but since the spring of 1907 a full multiple common battery switchboard of standard design and manufacture has furnished the citizens of Conneaut as high a quality of service as is possible with that type of equipment.

Conneaut being located about twelve miles east of Ashtabula and connected therewith by two main lines of railway and an electric line, was in an exceptionally favorable position to observe the commercial operation of an Automanual plant, which was installed at the Ashtabula Harbor exchange a little more than three years ago.

Following the completion last fall of the second Automanual installation at the Ashtabula main exchange, the Conneaut company became so impressed with Automanual economies and service that it in February, 1912, placed a contract with the North Electric Co. for a complete Automanual installation at Conneaut. This work has been carried forward under some difficulties, owing to the necessity of installing the switching apparatus in the same room and immediately adjacent to the manual switchboard, while the latter was in operation. However, upon the morning of Aug. 4, everything was in readiness for the cut-over.

The Conneaut company had issued copies of its new directory some weeks before and they were in the hands of its subscribers. The outside construction was in excellent condition due to the watchfulness and care of Joseph Goebricher, Jr., a son of the general manager. Mr. Goebricher, Jr., has made it a practice to carefully test all circuits at stated periods with a view of preventing trouble rather than curing it, with the result that in the stormiest weather, permanent signals upon his switchboard are of rare occurrence.

At 7:35 a. m. the cut-over was begun and at 8:35 the entire 2,500 subscribers were working through the Automanual equipment. This without a subscriber having suffered the inconvenience of delay in a single call and without a case of trouble upon the central office equipment or upon the outside construction. The operators were sitting at the keyboards handling calls Automanually in a manner that would indicate that they had never handled them in any other way and this regardless of the fact that no one of them had ever before operated an Automanual keyboard.

This achievement speaks volumes for the Automanual system and for Joseph Goebricher personally, for the effi-

Here is a chance for YOU to economize

Red Seal Dry Batteries

are time and money savers. They last long and give the best of service while they last. They are economical cells. Test them at our expense—the guarantee protects you.

Write us for names of nearest jobbers, etc.

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Guarantee

We will *credit* account, *replace* batteries or *refund* amount paid for batteries including transportation charges if they do not prove satisfactory.

The Guarantee Protects You
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Girl is holding No. 1 Model

Send to the nearest Liquid Branch for one of these; put to any experimental test your ingenuity can devise, and prove the truth of our statements.

BUILT BY

"The Liquid" Carbonic Company

JACOB BAUR, Pres. and Treas.

CHICAGO New York Boston Pittsburg Cincinnati Milwaukee Minneapolis Atlanta St. Louis Kansas City Dallas San Francisco

What is it that puts out a FIRE?

When you turn a hose onto a fire, what happens?
Why does water, or a blanket, or sand put out fire?
Here's the answer:

All these things put out fire by SUFFOCATING it—shutting off its AIR supply.

Fire is a rapid form of oxidization—a union of certain elements in the wood or the insulation of your wires, with the oxygen of the air, and when the air supply is shut off the fire goes out.

And that is why the DIAMOND Liquid Carbonic Extinguisher is the best of all fire fighters

Because the carbon gas in the tank when turned onto the fire instantly shuts off the oxygen supply without which fire cannot live.

Carbon gas (soda water gas) is heavier than air. Turned into a switchboard it fills the whole cabinet just as water would fill it, only about ten times as quickly, and it leaves no damage in its wake.

It is dry, odorless, invisible, harmless, and it costs so little!

The Diamond Liquid Carbonic Fire Extinguisher is built in two sizes.

No. 1, 20½ inches high, round bottom. Holds 4 lbs. of Liquid Carbonic Gas. Complete with hose and couplings, F. O. B. Liquid Branches $12.50

No. 2, 28 inches high, flat bottom. Holds 6 lbs. of Liquid Carbonic Gas. Complete with hose and couplings, F. O. B. Liquid Branches 15.00

Refills, at any of the Liquid Carbonic Co.'s branches:

No. 1, each..... .75

No. 2, each..... 1.00

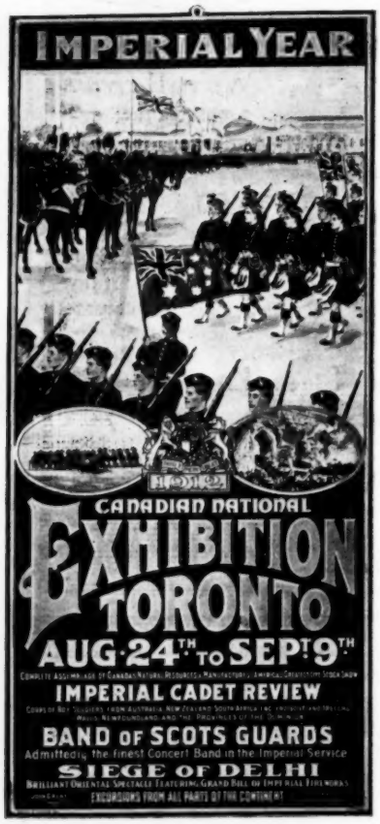
BOOKLET FREE

No. 2
28 inches high. 6 lbs. of gas

cient manner in which he has maintained his plant. It moreover proves the claim made by the manufacturer that Automanual operators can qualify as such in a minimum length of time.

The Toronto Exposition.

The Canadian National Exposition at Toronto is a government institution and brings hundreds of thousands of people from the Dominion and the United States to view the different products and the events which take place during the two weeks of the exhibition. Unlike most expositions, this one is permanent and has grown in number of buildings and extensions to grounds from year to year, out of the earnings of the previous years. This is Imperial Year and promises to be the greatest of all exhibition years in Canada. The Duke of Connaught, the new governor general of Canada, will officiate at the opening. Exhibitors are making greater efforts than ever to display their products to advantage in an imperial fashion.



Advertising the Exposition.

The Stromberg-Carlson Telephone Mfg. Co. has new, large quarters in a more prominent place in the Process Building and will strive to retain its previous awards as having the first and best telephone exhibit. This company reports that it expects to do a bigger business than ever at this exhibit, as many of its friends and customers have signified their intention of taking up business matters during these times. W. C. Freeman, manager of the Toronto office, will be in charge of the company's exhibit and will be assisted by I. W. Smith and E. M. Wolcott, also of the Toronto office. H. C. Slemin, sales and advertising manager of the company, who has these affairs under his charge, has made several visits to Toronto to supervise the plans for this year's important exhibition, and reports that everything is in readiness for visitors. All railroads and steamship lines institute low rates during the exhibition time and all telephone men who can reach Toronto will be well repaid by visiting the Independent telephone manufacturers, who are located in the Process Building.

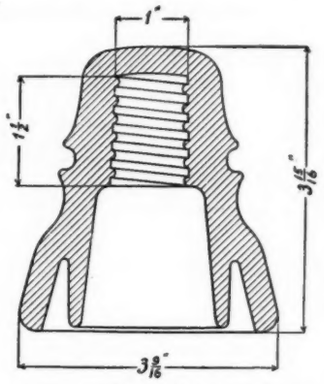
The illustration is a reproduction of the annual poster as issued by the Canadian National Exposition. Some of the principal features on the amusement programme are described in this poster.

The New Telephone and Telegraph Insulator.

The new Brookfield telephone and telegraph insulator, shown in the illustration, has been adopted by the American Telephone & Telegraph Co. and the Western Union Telegraph Co. It is being used generally on the lines of both companies. It is the result of many years of experimenting and is distinctive because of its great mechanical strength and its electrical efficiency.

The new insulator is said to be giving excellent results on the long distance lines of the telephone company and is being used extensively by many railroad companies.

It is an interesting fact that the Brookfield Glass Co. sold the first screw thread insulator to the Western Union Telegraph Co. in 1865. The remarkable progress this company has made in developing types of insulators for practically every insulating purpose is best indicated, perhaps, by the constantly increasing demand for glass insulators, for both high and low voltage transmission lines, not only in this country, but in Canada, England, Italy, France and in South America.



The New Brookfield Insulator.

The new plant of the Brookfield Glass Co. splendidly illustrates the permanency of the glass insulator industry. It is complete in every respect that makes for manufacturing efficiency.

Unlike many "essentials of electrical construction," Brookfield glass insulators have never passed out of the control of the family that conceived them. The business today is owned and managed by two of the grandsons of the founder of the Brookfield Glass Co.

Outing of the Stromberg-Carlson Employes.

On Saturday, August 3, the employes of the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., enjoyed their seventh annual outing at Sea Breeze Park, one of the resorts near Rochester. Of course "Phoney Bill" was present as may be judged from the illustration reproduced from the front cover of the program.

The program included athletic and fancy events of all kinds such as short dashes, potato throwing, egg race, threading the needle, baseball games, etc. The day was enlivened with the singing of popular songs the words of

Picnic Day!

IT WILL PAY YOU

to consider

BROOKFIELD INSULATORS

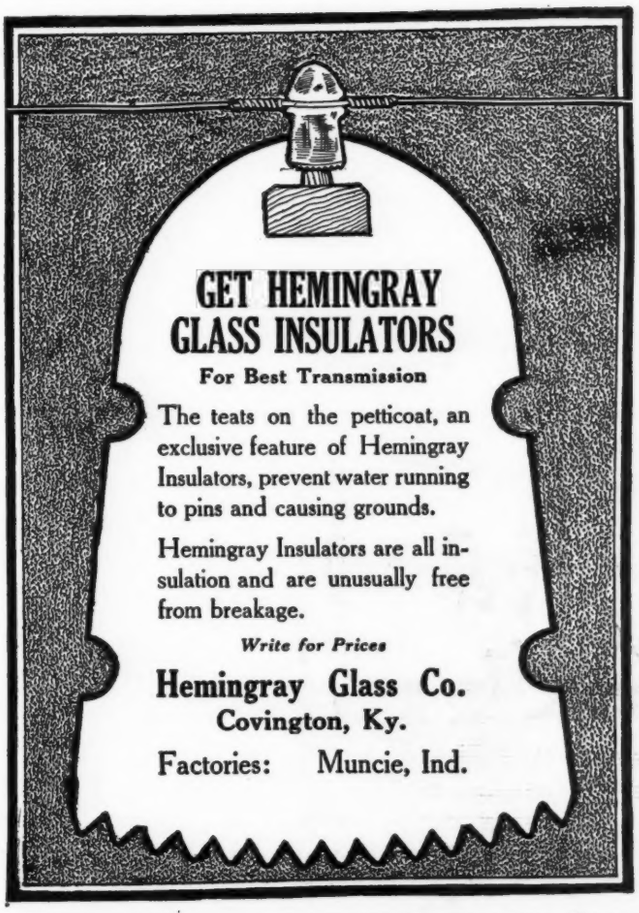
if only to the extent of asking your Jobber, or us to quote you prices.

You will be surprised.

Brookfield Glass Co.

2 Rector Street
New York, N.Y.

You can see Brookfield Insulators on High and Low voltage lines EVERYWHERE.



GET HEMINGRAY GLASS INSULATORS

For Best Transmission

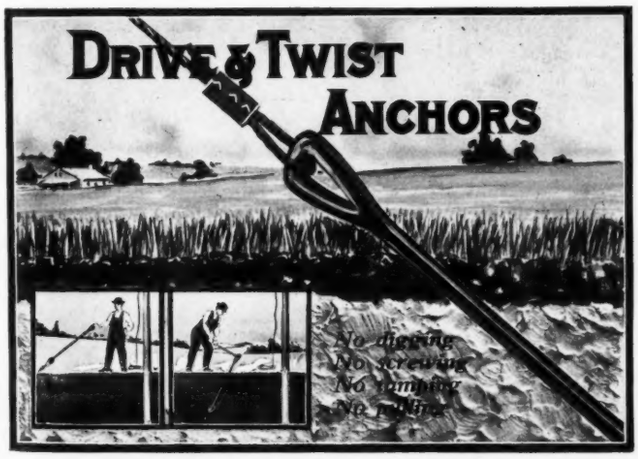
The teats on the petticoat, an exclusive feature of Hemingray Insulators, prevent water running to pins and causing grounds.

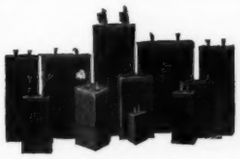
Hemingray Insulators are all insulation and are unusually free from breakage.

Write for Prices

Hemingray Glass Co.
Covington, Ky.

Factories: Muncie, Ind.



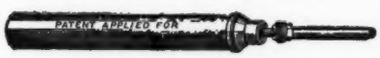


"MANSBRIDGE" TYPE, TELEPHONE CONDENSERS

embody all the essentials of long life and good service. *Write for Literature*

ELECTRIC SPECIALTY CO.
Cresco, Iowa

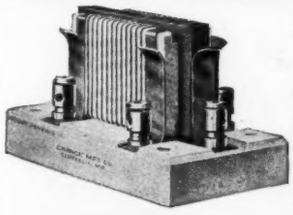
POT END HEAD



Requires no Wiping

H. E. ADAMS MFG. CO.
341 4th Avenue PITTSBURGH, PA.

ADAMS
Bonding Clamps
Cable Tap
Good Luck
Terminal
Cable Hangers



THE 400 COMPANION ARRESTER

Simple in construction. Once installed you are not troubled with renewals. Very dependable — ideal for toll line and rural service. No grounds or short circuits from carbon particles thrown off.

Chance Mfg. Co., Centralia, Mo.

Here's a Proposition
We will ship twelve anchors subject to your approval. We guarantee them to hold more and cost you less installed than any other anchor made. State if you want them for light, medium or heavy guy work.
THE VOTE-BERGER CO.
1848 W. Avenue
LaCrosse, Wisconsin

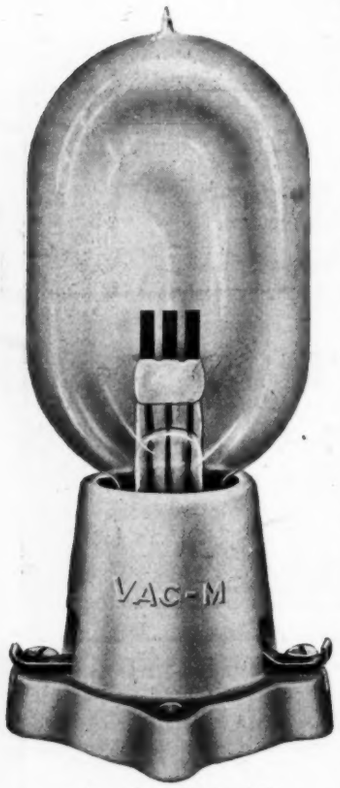
Please tell the Advertiser you saw his Announcement in TELEPHONY.

which were changed so that Stromberg and telephone were the features.

The outing of the employes was due to generosity of the Stromberg-Carlson company and it is always one of the red letter events of the year.

A New Style of Vac-M Lightning Arrester.

The National Electric Specialty Co., of Toledo, Ohio, has brought out a new and improved form of its "Vac-M" lightning arrester. It is of the well-known vacuum type, with a thick-walled globe of much greater capacity, but taking up no more space than formerly, and has a new and improved base.



New Vac-M Arrester.

The leading-in wires now used are of No. 20 B&S gage, instead of No. 36. Interposed between the electrodes and the top of the supporting glass stem is a refractory base, to protect the stem from the heat of any arc.

This new design produces an arrester with nearly ten times the capacity of the old type. In designing this new telephone type the company has embodied all the best features of its well-known Giant and Signal types, which have proven such a success in the railway automatic block signal, telephone train dispatching and high tension transmission field, and which have the emphatic endorsement of many well-known railway and high-tension experts. Numerous cases have arisen where telephone and telegraph lines in close proximity to high tension power circuits were practically useless and Vac-M arresters were of distinct service in making possible intelligent transmission.

An Interesting By-Product for Telephone Companies.

Since the last national telephone convention, where it was first exhibited, considerable interest has been manifested in the Multa Musola. Some of the claims made by the manufacturers of the device are as follows: It is practically the leading by-product of present day telephone service and offers magnificent possibilities for increasing telephone income. The object of the Multa Musola service is to distribute music by telephone wires from an instrument at the central office, so it can be easily heard in any part of a room without having to listen carefully. This does not interfere with the regular telephone service in any way. The music is reproduced with great volume and distinct tones at all delivery points, regardless of distance, this being pronounced the only known method of adequately distributing sound so as to cover a large space or spaces simultaneously without use of any head receiver or like device.

A simplified diagram of the Multa Musola system is given in the illustration. From the master transmitter, the sound is transmitted to the various amplifiers, the maximum number of amplifiers for one master transmitter being one hundred. The purpose of the amplifier is to multiply the number of reproducers that can be handled from one central station. From the amplifiers, wires lead to the subscribers' lines on the regular telephone circuits and thence to the reproducer at the subscriber's station. The minimum number of stations served by each amplifier is 5 or less; the maximum, 8; or a total of from 500 to 800 from one master transmitter.

The apparatus is remarkably simple and efficient, but it required exceptional skill and patience to develop and perfect. The operating and maintenance costs are very low, and it is adapted to manual or automatic systems. Even those who are familiar with the present high standard of phonographic music are amazed when they hear the Multa Musola. It eliminates practically all of the metallic and rasping sounds which are common to "mechanical music" and gives to the subscriber remarkably clear, sweet and natural sounds. It gives him and his family high-class entertainment without moving from his home, without the expense of a phonograph or records, and for a trivial additional rental on behalf of the telephone company. It is not necessary to listen closely and carefully at the receiver, for the music from the Multa Musola fills the room. It can be turned on or off at will, simply by the pressing of a lever.

This remarkable system is also well suited for motion picture theaters, halls, skating rinks, hospitals, etc., as it affords an extensive variety of the latest and best in musical entertainment. It can also be used for vocal bulletining of the latest news, base ball scores, etc., this auxiliary service being furnished from the exchange in like manner by a stentor and special voice transmitter. Special sporting service can thus be easily arranged for saloons, cigar stores, clubs, pool rooms, etc., at a good profit to telephone companies.

Installations of the Multa Musola may also be made independent of the telephone lines. Schools and factories present the leading examples of such cases. In several Chicago schools the children march in and out to Multa Musola music and listen with pleasure to the delightful strains of music by some celebrated band or singer. This service is given throughout the building, regardless of size. Factory installations have proven a great success, as they add perceptibly to the efficiency and economy of production.

Instructions can be readily made known in any part of the factory by transmission by the Multa Musola and Automatic Enunciator systems. The factory manager can be in all parts at an instant's notice by giving orders through this system. Workers will produce more, there will be more harmony among the employes when the monotony of the day's work is relieved by well chosen selections delivered from the Multa Musola to the various workshops. Up-to-date employers are realizing that such interest in their workers' welfare is bound to pay big profits in increased efficiency and for this reason Multa

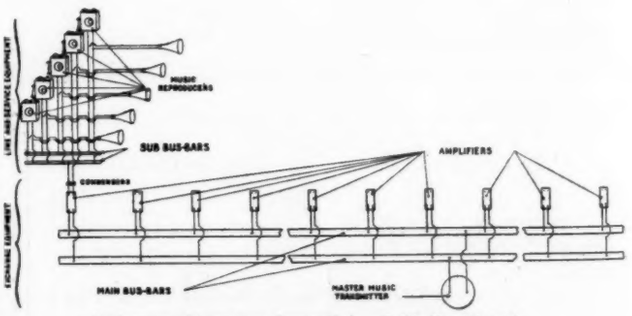


Diagram Showing Operation of Multa Musola.

WESTERN
CEDAR POLES
We treat our Poles and Cross Arms with Genuine Arvenarius

DOUGLAS FIR
CROSS ARMS
Pioneers in Western Pole Industry
Producers and Mfrs.—Not Scalpers
THE LINDSLEY BROTHERS COMPANY, Spokane, Wash.

The Orr Pole Reinforcing Process
Restores the life of poles which are decayed at the ground line. The Orr Reinforcement can be inexpensively applied without interrupting service. Send today for our valuable book on Pole Reinforcing.
PITTSBURGH REINFORCING POLE CO.
435 Sixth Ave., - PITTSBURGH

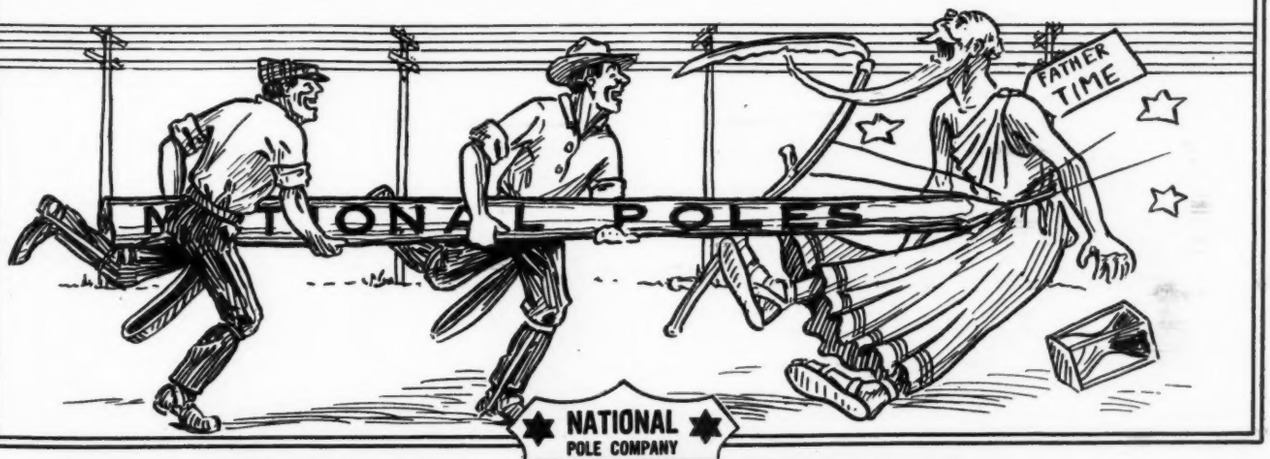
Idaho Cedar Poles
Northern Mercantile Co. Ltd.
Resident Producers
Sand Point, Idaho

IDAHO AND NORTHERN
CEDAR POLES
WE ARE PRODUCERS
Yards in IDAHO, MICHIGAN, CANADA.
Toledo Yard for Urgent Orders. : : Get our Prices.
Ask for Leaflet No. Six
THE F. BISSELL COMPANY, TOLEDO, OHIO

POLES OF
STERLING QUALITY
Oldest Cedar Pole Firm in Business — Producers for 32 Years
MICHIGAN WHITE CEDAR
W. C. STERLING & SON COMPANY
1880 MONROE, MICHIGAN 1912

White Cedar Poles
C. H. WORCESTER CO.
CHICAGO

CEDAR POLES
We have a fine lot of poles, especially 4" 20'.
Our poles are strong and tough—the kind you need for long service.
LET US SEND QUOTATIONS TODAY
PERLEY LOWE & COMPANY
1605 Railway Exchange Building, CHICAGO



NATIONAL POLE COMPANY
ESCANABA, MICH.
CEDAR POLES

"FROM THE STUMP TO THE LINE"

Very Few Systems Employ Flimsy Construction any more. The Better the Company, the Better Its Methods. We are Able to Fill the Most Exacting Requirements of the Very Best Companies.

Over fifteen years of experience in WHITE and WESTERN **CEDAR POLES**
Exceptional Facilities. Yards at the Most Favorable Shipping Points.

National Pole Co., Escanaba, Mich.

Musola and automatic enunciator installations may be readily made in the leading factories by the telephone company.

As Multa Musola service is sent over the regular telephone wires, it does not involve the purchase of expensive equipment or additional maintenance costs of any importance. On the other hand it can readily be seen that it is almost universal in its attractive appeal and should add materially to the income of the telephone company as well as to "the sum of human happiness." It has even been claimed, and authentic proof offered in substantiation, that Multa Musola revenue will exceed that of the regular telephone service in many exchanges where rates are low. As the Multa Musola device is sold to but one telephone company in each town, it can be made quite a force for soliciting business in towns where there is competition.

Its manufacturer, The Automatic Enunciator Co., Chicago, has been ultra-conservative in the introduction of the Multa Musola as it insisted that everything be absolutely right before the apparatus was placed on the market. The demand can now be supplied by apparatus that has all of the ear-marks of an old, established proposition. It is believed that telephone men generally will avail themselves of this opportunity of increasing their revenue through a by-product which their subscribers will appreciate and be glad to adopt.

The Automatic Enunciator Co. is well known for its work in loud speaking and long distance transmission. Its automatic enunciator is a practical, simple, loud speaking telephone, consisting of the following parts: The transmitter, the reproducer, through which the sound is reproduced in a magnified volume; and the amplifier, which is used when a very large number of reproducers are to be energized by one transmitter, or when the sound is to be transmitted an extremely long distance.

This device evidently has many wide fields which can be profitable exploited by telephone companies. Some of the uses to which the automatic enunciator can be placed to advantage are: In railroad stations for announcing trains in the lunch rooms, waiting rooms, smoking rooms, barber shops, etc., there being no added expense, confusion or annoyance; on railroad trains and street cars for making clear and loud station and street calls; for train dispatching, the orders transmitted by the automatic enunciator being clearly heard in any part of a room without the use of a head receiver. In short, the apparatus bids fair to become immensely popular throughout the railroad field as it offers wonderful possibilities for long distance work, improvement of service and reduction of expenses.

In hotels the automatic enunciators may be used to page guests in any part of the house, it being already successfully employed for that purpose. In convention halls, schools, etc., speeches may be delivered to any room or rooms so that all may hear.

In long distance telephone work, the automatic enunciator has been tested over circuits approximating the lines between Chicago and New York, with results which were startling in accuracy and strength. Automatc enunciator and Multa Musola equipments are installed under a rigid guarantee by the manufacturer that they will do all that is claimed for them.

Paragraphs.

FRANK B. COOK, of Chicago, manufacturer of telephone protective equipment, during the past week received an order from Nome, Alaska, and one from Perth, Australia. It truly may be said that the Cook products are known to the extremes of the earth.

THE SWEDISH AMERICAN TELEPHONE MFG. CO., 5235 E. Ravenswood Park Ave., Chicago, announces that in the future all Canadian orders will be filled by the Chicago factory. It reports a healthy, growing amount of business with every favorable prospect for an excellent fall trade.

THE CENTURY TELEPHONE CONSTRUCTION CO., Buffalo, N. Y., is rushing the work on the new switchboard for Ithaca. It is expected that it will be completed about September 1. The contractors have promised to have the building ready in time for the new installation. The plans and specifications are complete for all the new underground construction and work will commence on it at once.

H. T. WATTERS, who for some time past has been manager of sales for the Handy Mike and other Ericsson products, including the famous steel telephones, has resigned to engage in the automobile field. Mr. Watters has been connected with the telephone industry for some years, having been identified with the Stromberg-Carlson Telephone Mfg. Co. prior to his association with the Ericsson company. His many friends will hope to see him succeed in his new undertaking.

Legal Cases and Decisions

By A. H. McMillan

Rights on Private Road.

The N—— Telephone Co. is a corporation under the laws of Kansas, having something over 250 telephones, mostly rural. We recently extended one of our rural lines along what we supposed to be a public road. The owner of one of the abutting quarters of land, who is a non-resident, has sent us notice to remove our poles, claiming that it is not a public road. The road has been used for 25 or 26 years, and is on the section line. Please give us the law as to our rights in such a case Can he compel us to remove the poles?

If the road in question is a public road, you undoubtedly have rights there under the authority of Kansas. If, however, it is a private road, the abutting owner can compel you to remove your lines or else compensate him for the privilege of allowing them to remain there. We, of course, cannot tell what kind of a road it actually is.

Impairing Obligation of Contract.

The American Telephone & Telegraph Co. filed a bill of complaint for an injunction against the town of New Decatur, Alabama, alleging that on June 17, 1908, the town passed an ordinance granting to the company's predecessor a franchise to conduct and operate a telephone line on the streets and highways of a town under the direction of the Street Committee, but providing that "Said company shall be subject to all ordinances in force or which may hereafter be passed, relative to the use of said highways of said town."

The bill also set forth that the telephone system was constructed at a great expense under such ordinance and that the same has been operated since December 21, 1898; that on March 4, 1904, the town adopted an ordinance repealing the franchise ordinance, and on May 3, 1904, passed an ordinance requiring the company to remove its poles, wires and fixtures from the streets. It directed the police officers of the town to remove the same in case the company did not, and declared that such poles, and wires, if not removed, should be considered a nuisance.

The bill also set forth that the carrying out of this ordinance would impair the company's contract rights and destroy its property and right to do business, and asked for an injunction against the enforcement of this ordinance.

The Alabama Constitution of 1875 provides that no law impairing the obligation of contracts or making any irrevocable grants of special privileges or immunities shall be passed by

CEDAR

NORTHERN POLES WESTERN

We are pioneers in the butt-treatment of poles using Creo-Wood Preserver. Write us.

THE VALENTINE-CLARK COMPANY
MINNEAPOLIS, MINN.

Western Sales Office: St. Maries, Idaho

WHITE CEDAR POLES

We handle just the poles for your purposes—the kind that you can depend upon to give service.

We are producers of poles—not jobbers. Consequently reasonable prices.

Let us quote you on your next order.

KAYE & CARTER, 1043 Lumber Exchange Bldg., Minneapolis, Minn.

CEDAR POLES

Prompt Shipments.
Write for Prices.
Torrey Cedar Co., Clintonville, Wis.

They last longer in any soil—Stand twice the breaking strain of others.

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LARGE STOCKS
LOW PRICES
QUICK SHIPMENTS

Write to-day to PADUCAH POLE & TIMBER CO.,
Paducah, Kentucky

IDAHO CEDAR POLES

This particular kind always gives satisfaction. Never known to fail.
Get our prices. PEND OREILLE CO., Clarks Fork, Idaho

Oldest in the business.

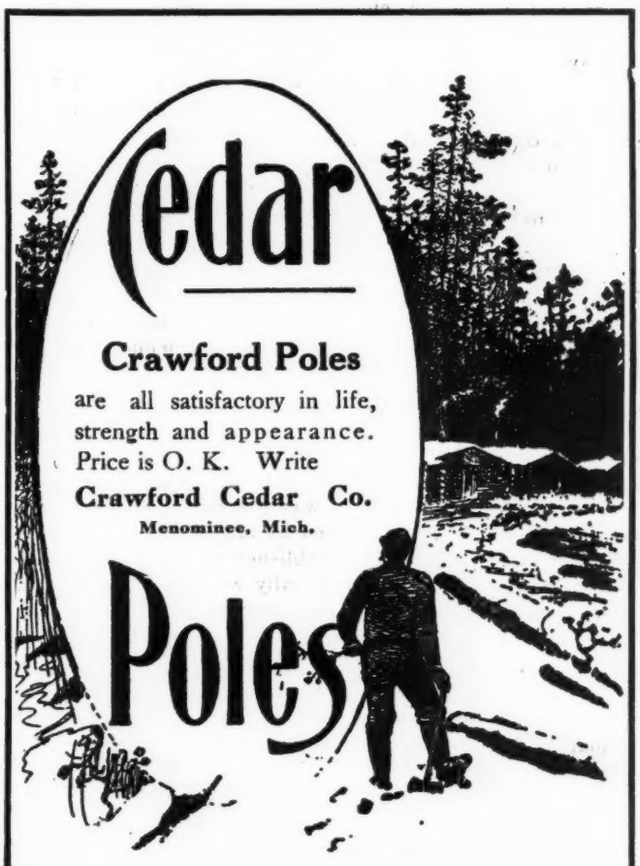
POLES *and* CROSS ARMS

Prompt Shipments
Lowest Prices—Write

WM. MUELLER & Co. 920 Postal Teleg. Bldg.
Established 1862 CHICAGO

In 1910 The telephone and telegraph companies bought 3,870,694 poles, or 73.2 per cent of the total number bought. The steam railroads bought 7.9 per cent, and the electric light, power and railway interests 18.9 per cent. Over 21 per cent of the poles bought in 1910 were given some preservative treatment.
—*From recent U. S. Official Statistics.*

Every producer of poles and every seller of preservatives, as well as all those who market articles for pole line construction, should have their announcements in TELEPHONY. It is the cheapest and most effective means of covering the world's greatest market for such supplies.



Idaho Red Cedar Poles

Sandpoint Lumber & Pole Co., Ltd.
SANDPOINT, IDAHO.

Large Stocks—Prompt Shipments
Good Quality—Right Prices

NAUGLE Pole & Tie Co.
5 South Wabash Ave.
Chicago, Illinois

The Trinity in Poles
"Service—
Price—
Quality."

POLES

the General Assembly. The constitution of 1901 contains a provision almost identical, except that it adds thereto the provision that every grant of a franchise, privilege or immunity shall forever remain subject to revocation, alteration or amendment.

The town demured to the bill of complaint, contending that it did not state any cause of action. The supreme court of the state sustained the lower court in overruling the demurrer, and deciding that a cause of action was set forth under the constitutional provisions above quoted. Justice Mayfield dissented in a long opinion. Town of New Decatur vs. American Telephone & Telegraph Co., 58 Southern, 613.

Original Location of Companies.

Telephone companies must exercise reasonable care in the original location and construction of their lines and must maintain them in such manner as to prevent injuries to persons using the highway over which they are constructed. So held the supreme court of Arkansas in an action brought against a telephone subscriber who constructed a line from his residence to a city limit, at which point a telephone company connected his wire with its exchange. It gave him telephone service, and on notice and at its convenience, repaired the wire at the expense of the subscriber. The telephone subscriber and the company were held to be jointly liable and a verdict for the plaintiff was sustained. Arkansas Telephone Co. vs. Peters, 148 Southwestern, 273.

City Franchise Necessary in Iowa.

Under the laws of Iowa, a telephone company has not the right to construct and operate its lines in and through the streets of a city or town and to maintain a local telephone system for the transaction of general telephone business therein, without procuring from the city authorities a license to use of the streets and transact the business. This is the holding of the Supreme Court of Iowa on a rehearing of the case of East Boyer Telephone Co. vs. Incorporated Town of Vail, 136 Northwestern, 120.

Out of the Mail Bag

It is hard for a publisher to decide which is the more gratifying—a letter from a subscriber commending the editorial contents of his paper, or a letter from an advertiser expressing satisfaction at the way his "ad" pulled him results. Anyway, both kinds of communications are welcome, and with all modesty, we think TELEPHONY gets its share of each. Some time ago W. P. Dozier, general manager of the Mutual Telephone & Telegraph Co., with general offices at Stillmore, Ga., inserted an advertisement in TELEPHONY. Last week he wrote: "We have had numerous replies to this advertisement. In fact we think most all the telephone people in the United States must read TELEPHONY, as it seems we have had answers from almost every state."

W. C. Dillon, manager of the Corsicana (Texas) Telephone Co., in a recent letter says: "You people deserve great credit for the time and attention that you give the great Independent telephone public. I want especially to compliment you on your 'telephone man's bible for 1912,' which you issued under the title, 'The Telephone Buyers' Guide Directory.' It's a great help."

This confirms what we have always contended, that use of TELEPHONY's Directory will prove of inestimable value to managers and buyers in the telephone field. The book is so arranged that any buyer in the market for telephone supplies can readily place himself in touch with the live, progressive dealers in all lines and secure prompt service, reliable goods and best prices.

In this connection TELEPHONY again reminds its readers that if they will notify us when in the market for any kind of supplies mention will be made of their wants in TELEPHONY's bulletin service which is read by all the leading manufacturers and supply dealers in the trade, who will communicate direct with those desiring catalogues, prices or information of any kind. On request, TELEPHONY will forward blanks for subscribers to fill out stating what supplies they require.

In his letter renewing his subscription, William L. Crow, general manager of the Crow Telephone System, at Fairview, Mo., says: "We find many good things in TELEPHONY, good practical suggestions for telephone work that we appreciate very much."

"We thank you for a mighty good magazine," writes C. W. Kugelman, of Portsmouth, Ohio.

"Your paper has been quite a help to me in my work as a lineman or trouble shooter," writes George R. Miller, of Danbury, Neb.

"I think any progressive telephone company should have TELEPHONY to keep up with the times," writes W. B. Douglass, of Sciota, Ill.

A. N. Crosby, of Davenport, Ia., requests that a sample copy of TELEPHONY be sent to a friend, and adds: "I think every telephone man ought to be a subscriber."

"I think your publication is A1," writes John W. Chrisman, of Center, Colo., in a letter renewing his subscription.

"Who that ever reads one copy of TELEPHONY would fail to watch eagerly for the next and the next?" writes H. Lee Sellers, of the Telepost, in a letter remitting for his subscription. "I know of no big industry so thoroughly and adequately held in hand and represented as Independent telephony is by your admirable weekly.".

C. L. DeWitt, secretary of the Grange Telephone Co., at Rushville, Ill., sends in his renewal order and adds: "While the magazine is good in all departments it is your Mr. Kelsey that makes it incomparable."

F. H. Clark, proprietor of the Clayton-Texline Telephone Exchange, at Clayton, New Mexico, sends in his check and writes: "I was sincere when I told you I did not have time always to read it, but I will renew my subscription to TELEPHONY for the sake of my operators, especially the night operator who enjoys reading the magazine and looks forward to its arrival. Not that I think any less of TELEPHONY or am less interested than before. No; far from it, but I am taking five magazines, all the county papers, three leading dailies and about all I can do is to glance at the cartoons and headlines, look and see who won the ball games and then go to sleep. I think every year I am going to cut down on my work and let the other fellow do it, but when it comes to the point I find myself hard at work. I am doing the repairs and trouble shooting for three exchanges, aggregating about 400 telephones, so you know what that means. I have nothing but kind words and friendly feelings for your valuable journal, and I do not mean to flatter you when I say that I consider it by far the best telephone paper printed in the United States."

Mr. Clark certainly has his hands full, but we are willing to wager that he has the energy and ability to handle all his work and handle it well, too.

"I have been getting your good paper every week for about two years," writes Lee Shaver, proprietor of the Delta Telephone Co., at Delta, Ia. "It is a great paper and I would feel as though I was lost in the tall timber without it."

James H. White, manager of the Elkton (Ky.) exchange of the Todd County Telephone Co., says: "I couldn't very well get along in the telephone business without TELEPHONY."

In a letter enclosing remittance for his subscription to TELEPHONY, John E. Hall, manager of the Fulton Mutual Telephone Co., at Fulton, Kans., says: "I would not be without your paper."

W. S. Rowe, of the Great Western Telephone Co., at Philip, S. Dak., sends in his renewal, and adds: "I could not part with TELEPHONY as long as I remain in the telephone business. It is full of interest to me every week."

"I can speak in the highest terms of your valuable paper," writes L. C. Williamson, of Rockford, Ill.

Bernard W. Leavitt, of the City Telephone Co., of Southern Pines, N. C., sends in his renewal and adds: "TELEPHONY has been my right hand man for a long time and if there is ever anything I can do in addition to keeping our subscription paid up that will be of use to you, please command me."

"We are well pleased with the TELEPHONY and think it is just what every telephone company should have," writes the Centerville (Mo.) Telephone Co.

"I like your paper very much and could hardly get along without it," writes C. O. Bollum, of Sioux Falls, S. D.

Frank Ford, manager of the Barlow-Watertown Telephone Co., at Watertown, O., writes: "S. W. Harvey, our president, has taken TELEPHONY a number of years. He marks such items as he thinks will be of interest and help to me, and I have been getting much valuable information from your paper."

"I have found your journal very instructive and interesting," writes William G. Yeo, of Los Angeles, California.

EVERSTICK ANCHORS

Have the greatest holding power. More "Eversticks" used than all other patented anchors. *There's a reason.* Write for literature.

Everstick Anchor Co.
ST. LOUIS, MO.

COMMONWEALTH HOTEL

INC.
Opposite State House,
BOSTON, MASS.

Offers rooms with hot and cold water for **$1.00** per day and up, which includes free use of public shower baths.

Nothing to Equal This in New England

Rooms with private baths for **$1.50** per day and up; suites of two rooms and bath for **$4.00** per day and up.

Dining Room and Cafe First Class. European Plan.

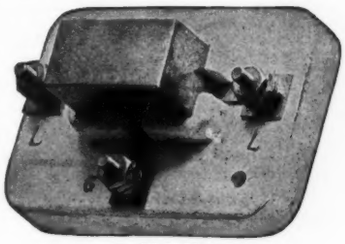
ABSOLUTELY FIREPROOF

Stone floors; nothing wood but the doors.
Equipped with its own Sanitary Vacuum Cleaning Plant.

Strictly a Temperance Hotel ***Send for Booklet***

STORER F. CRAFTS, General Manager

PROTECT YOUR TELEPHONES



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With The Roberts Self Cleaning Arresters

Many thousands of our arresters are saving money for our customers by doing away with arrester troubles. They do not become grounded after every storm. Why not try a small order now?

Order Roberts Self Cleaning Arresters and Simplex Pole Changer from your Dealer or Jobber. If not carried in stock, order direct and send his name.

Write now and you will be well pleased with the service which our arresters or pole changer will give you.

Homer Roberts Mfg. Co.
659 Melrose St. - - Chicago

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Hall's Hand Book of

STANDARD TELEPHONE CONSTRUCTION METHODS

By
FRANK B. HALL

280 Pages of Specifications.
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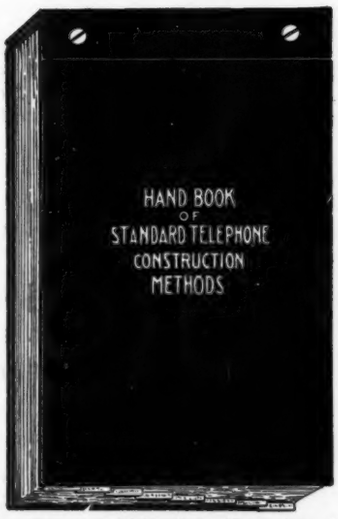

CONTENTS OF HALL'S HAND BOOK OF STANDARD TELEPHONE CONSTRUCTION METHODS

SPECIFICATIONS EXCHANGE AERIAL CONSTRUCTION, Class "A," "B" and "C" Standard Pole Lines, 22 Sections.

SPECIFICATIONS EXCHANGE UNDERGROUND CONSTRUCTION—12 Sections.

SPECIFICATIONS TOLL LINE CONSTRUCTION—Class "D" and "E" Standard Pole Lines, 12 Sections.

SPECIFICATIONS TOLL LINE CONSTRUCTION—Class "F" Standard Pole Line, 5 Sections.

SPECIFICATIONS SUB-STATION WIRING—2 Sections.

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FULL PAGE FIGURES SHOWING STANDARD METHODS—214 Pages.

This Entire Work—Non-Technical and Easily Understood

It is profusely illustrated with actual working plans and diagrams accompanying almost every page of text. It is printed on a good, tough quality of bond paper, pocket size, with binding that will stand hard usage in the field. It is loose-leaf so that one can add to or change pages of drawings or specifications as standards change; or add typewritten tables or other data and thus always have information of the same character properly grouped under one cover.

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TODAY—*Is the time to order. . . . Tomorrow you may have perpetrated some costly blunder which this manual would have helped you to avoid. . . Send money order, currency, or check for $4 to*

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Condensed News Reports

Officers of Companies are Earnestly Requested to Forward Us Promptly All Financial and Other Statements as Soon as Issued, and Any Items of Interest as to Their Plants and Systems

Personal.

E. O. TURNER has resigned the management of the Home Telephone Co., in Tarkio, Mo. He will continue in the telephone business, removing to Roodhouse, Ill.

F. W. CARROLL, of Fort Collins, Colo., has been appointed district manager in Ogden, Utah, of the Mountain States Telephone & Telegraph Co. S. J. Jones, the recently appointed manager, will be transferred to the Provo district.

FRED B. PATTON, formerly president of the Sandwich Electric Co., Chicago, and one of the best known men in telephone circles, attended a big family reunion at Fairdale, Ill., on Aug. 6, stopping off at Chicago for a few hours to visit old friends. Mr. Patton now is one of the leading insurance men of St. Louis.

FREDERIC P. VOSE was elected president of the Commercial Law League of America, at the eighteenth annual convention just held at the Antlers Hotel, Colorado Springs, Colo. Mr. Vose is well known to the telephone field as a member of the Chicago law firm of Vose & Page, which devotes a large part of its attention to the electrical industries.

There were nearly four hundred registered at this convention. Addresses were made by the Honorable John F. Shafroth, governor of Colorado; the Honorable Charles S. Thomas, ex-governor of Colorado, and Mr. Justice Rosseau A. Burch, of the supreme court of Kansas. There were also addresses by forty other lawyers from all over the United States and Canada.

The Commercial Law League is an organization composed of about 2,800 lawyers throughout the United States, Canada and Mexico. The object of the League is to promote uniformity of legislation and practice of matters affecting commercial law; to elevate the standard and improve the conditions of the professional practice; to encourage an honorable course of dealing among its members and in the profession at large; and to foster among its members a feeling of fraternity and mutual confidence.

Mr. Vose's election to the presidency of this big legal association is a high tribute to that gentleman's abilities, as well as his personal popularity.

New Companies.

HUGHSON, CAL.—Articles of incorporation of the Hughson Telephone Co. have been filed here. The capital stock is $5,000. The directors of the company are Ferrill C. Nickle, Ella S. Nickle and Della C. Lutz.

FULTON, ILL.—The stockholders of the Fulton Mutual Telephone Co. have voted to reorganize and incorporate the company with a capital stock of $8,000.

MENDON, ILL.—The Mendon & Loraine Farmers' Mutual Telephone Co. has been incorporated with a capital stock of $645. The incorporators are John Ausmus, S. M. and W. Curless.

DUGGER, IND.—The Dugger Mutual Telephone Co. has filed articles of incorporation, with $1,500 capital stock. The incorporators are: Nathan W. Ringo, L. N. Earle, Wilson McClellan, and Chas. E. Pigg.

GASTON, IND.—The Broyles Telephone Co. has filed articles of incorporation with $6,000 capital stock. The directors are Henry A. Broyles, Sherman Broyles, Henry M. Long, Charles M. Broyles, Wm. H. Broyles, J. W. Kirklin and Frank Blakely.

ADDISON, MICH.—Articles of incorporation have been filed by the Addison Mutual Telephone Co. The incorporators are F. B. Kline, Chas. Thiell, N. A. Saunders and Wm. R. Greenleaf. The capital stock is $3,000.

PIPESTONE, MINN.—Farmers in the northern part of Pipestone county have organized and incorporated the South Telephone Exchange Co. The company will have outside connections through the exchange at Lake Benton.

CHASELY, N. D.—The Chasely Co-operative Telephone Co. has filed articles of incorporation with $25,000 capital stock. The incorporators are: N. E. Kellems, Chasely, N. D.; G. D. Harrington, Bowdon, N. D., and G. F. Church, Chasely, N. D.

DUNKIRK, OHIO.—The Dunkirk Mutual Telephone Co. has been incorporated by Paul F. Dornbirer, B. F. McCloud, R. E. Clevenger, H. D. Jones, William McElree and W. H. Getz.

KINGSVILLE, OHIO.—The Kingsville Telephone Co. has been incorporated with $10,000 capital stock. The incorporators are C. S. Whelpley, R. A. McGreen, F. M. Beece, F. C. Reed, F. G. Howard, E. J. Hines and W. S. Childs.

WESTHOPE, OHIO.—The Westhope Telephone Co. has been incorporated by Fred Springborn and others. The capital stock is $350,000.

PALMERTON, PA.—The Palmer Telephone Co. has been incorporated by James E. Hayes, Jr., Palmerton, Pa.; James A. Singmaster, Palmerton, Pa.; and A. Polhemus Cobb, New York City. The capital stock is $15,000.

PINEWOOD, S. C.—Articles of incorporation have been filed by the Pinewood Telephone Exchange, with $1,000 capital stock. The directors are Walter D. Epperson, J. W. Weeks, R. C. Richardson and O. D. Haroin.

CASS, W. VA.—The Cloverlock & Burbin Mutual Telephone Co. has been incorporated to build a telephone line connecting Cloverlick, Durbin, Huttonsville and Greenbank. The authorized capital is $1,500, and the incorporators are: C. C. Wanless, H. L. Kesler and Allen Golford, of Wanless, W. Va.; W. R. Moore, of Stony Bottom, W. Va., and Max Curry, of Case, W. Va.

Construction.

FULLERTON, CAL.—Bids will be received up to September 2 for a franchise granting the right to erect poles, wires and other appliances and conduits for the transmission of electricity for telephone and telegraph purposes.

HOMER, ILL.—A new telephone line will be constructed from Urbana to Homer.

WHITESBURG, KY.—The Whitesburg, Telephone Co. will construct local and long distance lines from Whitesburg via Ermine, Craftsville and Head of River, to Jenkins, Ky., where connections will be made with the Eastern Kentucky Home Telephone Company's lines from Pikeville.

DOLAND, S. D.—J. B. Comly is receiving bids for the construction of approximately twenty-four miles of telephone line.

CONCRETE, WASH.—The Skagit River Telephone Co. contemplates extending its lines from Rockport to Marblemount. K. Glover is manager.

Franchises.

MOORHEAD, MINN.—The Tri-State Telephone Co. has applied to the city council for a franchise to operate toll stations for long distance calls at different points in Moorhead.

CELINA, TEXAS.—The City Council has granted the Union Telephone Co. of McKinney, Texas a permit to install a long distance exchange in Celina.

VAN ALSTYNE, TEXAS.—The City Council has granted a franchise for a period of twenty-five years, to the Union Telephone Co., of Kinney, Texas. The company has announced that, as soon as material is on the ground, it will begin the installation of a complete common battery all cable system, with underground conduit in the business section. This company has lately completed plants at McKinney and Plano.

Financial.

SUPPLY, OKLA.—The Fort Supply Telephone & Telegraph Co. has filed an amendment to its charter, increasing the capital stock from $10,000 to $15,000.

Elections.

SLIPPERY ROCK, PA.—The Slippery Rock Telephone Co. held its annual meeting recently and elected directors as follows: Dr. W. M. Barber, A. L. Caston, J. B. Buchanan, H. M. Gill, Prof. I. N. Moore and John A. Aiken. The officers elected are: J. B. Buchanan, president; Dr. N. M. Barber, secretary; A. L. Cooper, vice-president; and John A. Aiken, treasurer.

CANDO, N. D.—The Farmers Telephone Co., of Towner County held its annual meeting recently when the following directors were elected for the coming year S. W. Burkhart, E. T. Judd; and J. D. Leftwich. The board elected Mr. Burkhart president and E. T. Judd, secretary.